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PAPERS

IN

AGRICULTURE.

AGRICULTURE.

THE GOLD MEDAL, being the Premium offered for raiſing Oaks, was this year adjudged to LEWIS MAJENDIE, of Hedingham Caſtle, Eſſex, Eſq. from whom the following Paper and Certificates were received.

SIR,

I BEG leave to trouble you to preſent to the Society for the Encouragement of Arts, Manufactures, and Commerce, the encloſed Certificates: they atteſt my having planted five thouſand three hundred Oaks in two ſeparate incloſures in this pariſh. To theſe Certificates, in conformity with the directions of the Society, I alſo add an account of the methods purſued by me in making and managing theſe plantations.

The firſt plantation, containing four thouſand ſix hundred Oaks, was formed on part of the ancient Home Park, ſurrounding this Caſtle: the ſoil was dug one full ſpit, and the turf inverted; the plants were two-years-old ſeedlings, removed with the greateſt care from the ſeed-beed, by undermining the roots, ſo as to bring them up undamaged and entire in the ſtricteſt ſenſe: the ſub-ſoil of the intended plantation being a rich tender loam, holes were bored into it with an iron inſtrument, uſed in this country for fixing hop-poles into the earth: into theſe the trees were planted, uſing great caution that each ſeedling ſhould have a hole ſuitable to the length of its tap-root, which we were careful to ſet upright, and without doubling it: the tap-roots of theſe plants were from eighteen to thirty-ſix inches in length.

My motives for planting the trees without ſhortening their tap-roots, were theſe: it has long been aſſerted, that the Oak ſuffers greatly in value from tranſplanting, and that the timber of ſuch trees is of an inferior quality to that produced by ſowing the Acorn*.

A common practice in planting Oaks, is to ſow the Acorns in a bed; and, after one or two years, to tranſplant the ſeedlings into rows in a nurſery, where they remain two or three years longer; when the young trees are taken up, and their tap-roots being pre-

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* Whoever deſigns to cultivate the Oak for Timber, ſhould never think of tranſplanting it, but ſow the Acorns on the ſame ground where they are to grow; for the timber of all thoſe trees which are tranſplanted, is not near ſo valuable as that of the trees from the Acorns.—Miller's *Gardener's Dictionary*, fol. edit. 1739. Art. *Quercus.*

Oaks raiſed from the Acorn, without removing, on account of the tap-root ſtriking down into the ground, where there is leſs nouriſhment, grow ſlowly; but are, when they arrive at timber, the beſt, being generally fuller at heart, and more compact, ſtrong, and laſting. — Hanbury's *Body of Planting*, fol. 1770, Vol. I. page 5. Art. *Quercus.*

viouſly ſhortened, are finally planted out. Now, by this proceſs, it is plain the tree undergoes two removals before it is finally planted. To avoid this, I determined to plant out my Oaks at once from the ſeed-bed, with an idea that, by their receiving only one check inſtead of two, and this at ſo early an age, they would ſoon recover it, ſo as in the end to ſuffer no ſort of detriment; more particularly as by preſerving their tap-roots entire, the trees were planted as much as poſſible in a natural ſtate.

With ſome it is not unuſual to plant out young Oaks immediately from the ſeed-bed, but they are for the moſt part *tapped* at the time of removal; or, this operation is previouſly effected by an inſtrument introduced beneath the ſoil that divides the root, whilſt the tree is ſtill growing; after which it is ſuffered to remain in the ground ſeveral years before it is finally removed: but in both theſe inſtances the intentions of nature, in reſpect to this tree, ſeem to be violated. — Would it not be preferable, upon all occaſions of tranſplanting, with a view to timber, to remove the trees at as early an age as poſſible, and without any mutilation, from the ſeed-bed to the ſoil where they are to grow? By which, if the ſeminary (as it ever ſhould be) is at no great diſtance from the land intended to be planted, and that the eſſential requiſite of taking up the trees with the utmoſt care, is attended to, the removal will be hardly, if at all, felt; and, at all events, until the queſtion is decided, whether it is beſt, in order to procure timber of the firſt quality, to ſow Acorns where they are to remain, or to tranſplant Oaks, it is but reaſonable that the practice of tranſplanting (generally conſidered as inferior to that of ſowing), ſhould be conducted with as few deviations from nature as poſſible.

At the time of forming this plantation (December, 1786), I made the following experiments, with a view to a compariſon between young Oaks planted with their roots entire, and thoſe whoſe roots had been *tapped.* On the 5th of that month, I ſelected from my ſeedling Oaks twenty-four of the ſtraiteſt, and which were of an equal length, namely, three feet ſix inches from the extremity of the tap-root to the top of the plant, the root alone being twenty-ſeven inches, and the plant fifteen inches in length: twelve of theſe were planted in the ſame manner as the reſt of the Oaks in the incloſure with entire roots, and at the diſtance of five feet from each other: contiguous to theſe, and at the ſame time and diſtance, the remaining twelve were planted, taking off previouſly eighteeen inches from their tap-roots, ſo that nine inches only of root remained.

I wiſhed to obſerve the progreſs of theſe trees, at the expiration of a few years: accordingly, on the 6th of December laſt, 1791, I cauſed one of each to be carefully dug up, which I take the liberty of tranſmitting to you for the Society's inſpection.

I do not pretend at preſent to draw any accurate concluſion from this experiment; for indeed it muſt require long experience, and a courſe of years, to form decided opinions concerning a tree of ſuch ſlow growth as the Oak. I purpoſe, however, continuing my remarks upon theſe trees thus experimentally planted, by digging up others from time to time, in order to obſerve the comparative progreſs of their roots.

My intention in thus planting theſe trees, and remarking at various periods the degrees of difference between their growths, was with a view of aſcertaining hereafter, whether the planting of perfect oak-ſeedlings, without dividing their tap-roots, might not be the means of inſuring better timber than by the uſual method of planting thoſe which have been previouſly *tapped* for admitting the Oak, from the unremoved Acorn, in all caſes, to arrive at a ſuperiority of timber to that of the tranſplanted tree, at however early an age it is removed: ſtill, as long as the practice of tranſplanting Oaks is in uſe, it may be preſumed, that a ſeedling removed with proper care from the ſeminary, and planted entire, will prove ſuperior to one whoſe root has been mutilated; as having ſuſtained in its treatment a leſs deviation from nature.

The Society will remark that, in the perfect tree, accompanying this, the tap-root has acquired a regularity of thickneſs in its general growth, and that its lateral ſhoots are moſtly fibrous; becauſe the tree, having remained in poſſeſſion of its natural ſource of nouriſhment, was enabled, ſoon after being tranſplanted, to vegetate as before: on the other hand, the mutilated tree has thrown out a number of thick woody horizontal roots near the place where the tap-root was ſhortened, as if nature, to preſerve her produce, had been intent on repairing the damage ſhe had ſuſtained; after which, the root reſumes its natural downward tendency, with a regularity that might almoſt induce an idea that the root had never been at all divided. But, to remove the moſt diſtant doubt on this head, others of theſe trees have been taken up, in which, after the moſt careful examination, the ſame diſtinct modes of growth appear, as in thoſe now preſented to the Society. It may be farther remarked, that theſe trees have not ſucceeded ill with me, when it is conſidered they have only been planted five years, and were at that time only fifteen inches in height from the ground*. I could have ſelected larger trees from my plantation,

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* When the trees were dug up, I took the following meaſurements of each.

Oak planted with an entire Root.	Feet	Inches	*Oak planted with a tapped Root.*	Feet	Inches
Extreme height from the bottom of the tap-root -	11	2½	Extreme height from the bottom of the tap-root - -	10	3
Height from the ground -	7	7	Height from the ground -	6	9
Circumference cloſe to the ground -	0	6¼	Circumference cloſe to the ground -	0	6½

plantation, for the Society's inſpection, but preferred ſending the above, for the ſake of accuracy, as they were both planted the ſame day.

The ſecond incloſure, at ſome conſiderable diſtance from the former, and part of the ancient great park of this eſtate, was planted with ſeven hundred Oaks; and having in all reſpects received a ſimilar treatment with the firſt, it will be unneceſſary to trouble the Society with any farther account of it. Both plantations are ſecurely fenced, and in a very flouriſhing condition, the trees ſeeming ſuited to the ſoil. They have been carefully attended, and judiciouſly pruned; whereby they have acquired an upright growth, which, together, with their being planted tolerably thick, will inſure a length of ſtem.

I have only to add that, under a continuation of the preſent treatment, I can have no room to doubt the future ſucceſs of theſe plantations; and that if the obſervations upon them, which I now have taken the liberty of troubling you to preſent to the Society, ſhall be found worthy their notice, it will add conſiderably to the pleaſure I have experienced in forming them. With theſe ſentiments, I have the honour to remain,

SIR,

Your moſt obedient,
and very humble ſervant,

LEWIS MAJENDIE.

Hedingham Caſtle, Eſſex,
January 1, 1792.

Mr. MORE.

I, JAMES MONTGOMERIE, ſervant to Lewis Majendie, of Hedingham Caſtle, in the county of Eſſex, Eſq. do hereby certify, That, with proper aſſiſtants, I planted five thouſand three hundred Oaks, in two ſeparate incloſures, in the pariſh of Caſtle-Hedingham, at the diſtance of about ſix feet between the plants. The Oaks were two-years-old ſeedlings, and, excepting a very ſmall number, were planted without cutting, or in any way ſhortening the tap-roots. The aforeſaid trees are, at this time, in a moſt promiſing ſtate, having grown with unuſual luxuriance. They are ſecurely fenced, and bid fair to become, in due courſe of time, very profitable Timber-trees.

I further certify, that there are five thouſand two hundred healthy Oaks now growing in the above two incloſures.

JAMES MONTGOMERIE,
Gardener to Lewis Majendie, Eſq.

Caſtle-Hedingham,
November 2, 1791.

I DO hereby certify, That I have this day viſited the above-named plantations of Oaks, which are in a moſt healthy ſtate; and I do verily believe the facts, as ſtated by James Montgomerie in the above Certificate, to be true.

George Caswell, Curate of the pariſh of Caſtle-Hedingham.

Caſtle-Hedingham,
November 12, 1791.

THIS is to certify, That I have this day, as well as frequently at different other times, viſited two incloſures planted with Oaks, by order of Lewis Majendie, Eſq. in this pariſh; that they are in a very thriving ſtate, and ſecurely fenced. I alſo further certify, That, having been witneſs to the forming theſe plantations, I believe the above Certificate, ſigned by James Montgomerie, to be ſtrictly true.

Barker Myall, Churchwarden of the pariſh of Caſtle-Hedingham, in the county of Eſſex.

November 7, 1791.

The Gold Medal, being the Premium offered for planting Mixed Timber-Trees, was this year adjudged to John Holliday, of Dillorn, Staffordſhire, Eſq. from whom the following Letters and Certificates were received.

SIR,

YOU, who have been an eye-witneſs of the barren appearance of the Moorland Hills of Staffordſhire, will be particularly pleaſed to hear of any attempt to ornament them with plantations. If the encloſed reflections on the planting Mixed Timber-trees on mountainous and unprofitable ſituations, ſhould prove acceptable to the Society of which I have the honour to be a Member, it will give real pleaſure to,

Sir,

Your humble ſervant,

John Holliday.

Lincoln's-Inn,
January 18, 1791.

Mr. More.

SIR,

THE Society for the Encouragement of Arts, Manufactures, and Commerce, have of late years, in an eminent ſtyle, promoted the growth of Mixed Timber-trees. Their early and laudable attention to the Oak, at a period when the officers and artificers of our royal dock-yards, lamented that the ſupply of ſhip-timber had diminiſhed, is worthy to be honourably recorded. But as every ſoil is not congenial to the Oak, planters of every denomination ſhould embrace the opportunity of giving beauty to their grounds, of profiting by experience, and attentively conſidering what particular kind of wood is adapted to, or flouriſhes beſt in any particular ſoil. The advantages which may naturally be expected to flow from this attention, are numerous, permanent, and ſolid: numerous, in regard that the planter who attends to the different kinds of ſoil in his nurſeries, may alone be ſaid to let his ſeed fall on good ground.

The produce will amply reward his judgment, and crown his labours with ſucceſs. The ſeedlings will be vigorous, as well as innumerable. I beg leave to produce the following inſtance:—The Beech Maſt, of the year 1786, was uncommonly fine; from one buſhel and a half, kept in ſand till the ſpring following, not leſs than one hundred and fifty thouſand young beech were raiſed; and, in the courſe of three years, the planter can certify that, in tranſplanting about one hundred thouſand, not one hundred ſickly plants were to be found. Specimens of the healthy plants might be produced, to prove that Moorland Hills, which for ages have not been deemed worth cultivating, may be converted to very uſeful and profitable purpoſes. The ſolid advantages may alſo be evinced from the vigorous leading ſhoots made by healthy plants from year to year, when they are placed in a proper ſoil. Here, if the reference to a ſingle Spruce Fir may be pardoned; if one may be preſented as a picture of the reſt;—the fact can be aſcertained by twenty credible witneſſes, that, in the ſummer of 1789, the leading ſhoot of a Spruce Fir actually meaſured two feet eleven inches and a half, bold and tapering, crowned with ſeven balls, to form the horizontal branches of the ſucceeding year.

But, to return to the ſubject of Mixed Timber-trees, from which I have a little digreſſed—the increaſed beauty of woods, in conſequence of the culture of mixed Timber-trees is evident to every diſcerning eye. Whoever beheld the autumnal garb, wherewith a flouriſhing wood is gracefully robed by the hand of nature, without admiring the variety of light and ſhade it preſents? And if this diſcrimination is pleaſing in the ſober autumn, when reflexion is awake, when the joy is damped by the falling honours of the foreſt, reminding us of the approach of winter, how ſuperlatively pleaſing muſt be the vernal tints, dreſſed in all the gay appearance of ſpring! But, in this beautiful ſcenery, Prudence ſeems to whiſper, "Be ſparing of theſe agreeable tints, and ſcattered beauties; let not theſe ornamental, or ſhade trees, if I may be allowed the expreſſion, be either too numerous, or unſkilfully placed." Diſappointment will evidently flow from the miſtake; will greatly diminiſh, if not deſtroy, the pleaſing effect they were intended to produce. The planter ſhould cautiouſly avoid ſacrificing profit to the pleaſure of variety in his woods. Art ſhould ever be the hand-maid of Nature; and the planter cannot too attentively ſtudy the quality of the ſoil: the leading features of his woods ſhould be true to nature; and while the Scyon Oak ſuperabounds and ſtrikes deep into clay; while the Larch loves a light loam, or gravelly ſoil; while the more hardy northern Firs will ſhoot their fibres through the interſtices of barren rocks; while the beautiful Beech is modeſtly diſpoſed to flouriſh in a poor ſandy waſte; in theſe and many other inſtances let Experience lead the way; ſhe will promote the culture of, and rejoice to ſee thoſe trees predominate, which are moſt congenial to each different ſoil. I am with reſpect,

SIR,

Your ſincere humble ſervant,

JOHN HOLLIDAY.

Mr. MORE.

P.S. Planting, I will readily own, is my favourite and principal amuſement in the country; yet it by no means ſhuts out other improvements: the cultivation and improvement of commons or waſte land, have engaged my attention ſeveral years; and I have the pleaſure to add that, by means of ploughing deep, burying the goſs or furze, the principal produce of theſe Moorland Hills, and croſs-ploughing the following year, to kill more effectually the roots and fibres, a very few years ago I let to a tenant, Mr. James Dunn, twenty acres of this new-improved land, meliorated with a good white coat of lime, at the rent of fifteen ſhillings per acre, which in its priſtine ſtate was not worth two ſhillings and ſixpence per acre. It was very pleaſurable to me, in the ſucceeding year, after the tenant had reaped a heavy crop of fine oats, to receive his application for ſome additional acres of the common, at fifteen ſhillings per acre. I could not in prudence comply with his requeſt, by reaſon the land that he petitioned for, gave me the command of a fine road; yet I could not avoid replying, that I was very glad to find he was in love with Dillorn Common at fifteen ſhillings an acre, which, ten or a dozen years ago, was not conſidered worth a tithe of that ſum.

This is a true account, which can be certified by the tenant of the land at this day; ſo diffuſive and ſo general are the national benefits which flow from the exertions of individuals patroniſed and encouraged by the Society for promoting Arts, Manufactures, and Commerce, who may be ſaid to make the barren wilderneſs to ſmile, and the ſtony rough places, by planting, to become not only picturesque and ornamental, but ultimately of great national benefit.

WE, the Rev. John Woolfe and James Dunn, of Dillorn, in the county of Stafford, do hereby certify, That the annexed account is very correct, he the ſaid James Dunn being the perſon who deſired to have more ground at the rate of fifteen ſhillings an acre.

John Woolfe,
James Dunn.

THIS is to certify, That John Holliday, Eſq. has planted, on twenty-eight acres three roods and twenty-eight poles of land, well encloſed with good hedges, at Dillorn, in Staffordſhire, one hundred and thirteen thouſand five hundred Mixed Timber-Trees, between the 1ſt of October 1789, and the ſpring following, at three feet diſtance on the average, and that they are now in a thriving ſtate.

Certified by us, this 14th of December, 1791, who remember the above plantations being made, and have lately ſeen them in a thriving and healthy ſtate.

B. WOOLFE, Vicar of Caverſwall.
J. WOOLFE, Miniſter of Swinnerton,
THOMAS STEEL.

WE, whoſe names are hereunto ſubſcribed, are well acquainted with and have viewed the extenſive plantation of John Holliday, at Dillorn, in the county of Stafford, Eſq. and certify the ſame appear to us to be well fenced, and in a very flouriſhing ſtate at the end of two years after the ninety-five thouſand Beech, and other Mixed Timber-trees, particulariſed in the annexed paper, were to our knowledge planted out.

B. Woolfe, Miniſter of Caverſwall, and Maſter of the Grammar-School at Dillorn.

Thomas Steel, Land-Steward to John Holliday, Eſq. and Aſſiſtant in theſe Plantations.

Dillorn,
October 10, 1791.

A Liſt of the Trees planted at Dillorn, Staffordſhire, on the Eſtate of John Holliday, Eſq.

10,000	Oaks
500	Ever-green Oaks
600	White Spruce
94,000	Beech
7,900	Larch
100	Lombardy Poplars
100	Black Italian ditto
50	Weeping Willows
25	Hemlock Spruce
25	Cypreſs
200	White Spruce
113,500	

The method uſed in making the Plantations was, with reſpect to the Beech, by digging a roundiſh hole, about the diameter of two ſpades, by preſerving the beſt turf, and placing it on the ſouth-weſt; which, by experience, has been found to anſwer two uſeful purpoſes, firſt, that of protecting the young plant from our greateſt ſtorms in winter; ſecondly, in ſhedding the beſt ſoil in the bed of the hole, both winter and ſummer.

The nature of the Beech ſoil is light, with ſharp gravel; of the Oaks, fine deep clay.

Thanks were returned to NATHANIEL KENT, Eſq. for the following Communication reſpecting the Uſes and Value of the Cheſnut-tree.

SIR,

SINCE I have had the honour of becoming a Member of the Society for the Encouragement of Arts, Manufactures, and Commerce, I have read with great ſatisfaction Mr. Majendie's judicious remarks upon the Spaniſh Cheſnut, in the Ninth Volume of their Tranſactions, page 17; and obſervation and experience have long convinced me, that it is the moſt profitable tree that can be planted. Although the character which he gives of it, has in a great meaſure anticipated what I had to ſay in its favour, ſtill I am perſuaded a few more particulars relative to it, will not be conſidered impertinent or ill-timed, though it may in ſome inſtances carry the appearance of repetition.

I entirely agree with Mr. Majendie, that, for hop-poles and ſtakes, it has no equal, in point of durability, and conſequently no underwood can be applied to thoſe purpoſes with equal profit. He ſeems to think, indeed, that it is not ſo quick in its growth as Aſh, upon a moiſt ſoil: I think it is not; but, upon a ſand or loam, I apprehend it will keep full pace with the Aſh, and attain ſufficient ſize for hop-poles, in fourteen years, and be worth at that age two guineas a hundred, and laſt, with proper care, twenty years; whilſt Aſh, which ſeldom comes to ſufficient ſize in leſs than twenty years, will only bear two thirds of the price, and decay in half the time.

For gates and hurdles it is equally good; and being leſs heavy than Oak, is another great recommendation to it; as it is removed from one place to another with greater eaſe. To theſe and many other purpoſes, Cheſnut, trained and cut as Underwood, is peculiarly adapted; and, in point of beauty, no wood ſurpaſſes it; as it admits of cloſe planting, runs ſtrait in its branches, and always appears florid and healthy.

I ſhall next conſider the value of the Spaniſh Cheſnut for timber, in which (except for the unrivalled purpoſes of ſhip-building) it will be found for moſt uſes equal to the Oak, and in buildings and out-door work much ſuperior.

In 1676, an anceſtor of the preſent Mr. Windham, of Felbrigg, in Norfolk, had the merit of being a conſiderable planter of Cheſnut. In the ſpace of fifty years, it is preſumed theſe plantations required thinning, as his ſucceſſor, about that time, began to apply this timber to uſeful purpoſes upon his eſtate.

The firſt account is, of the branch or limb of a Cheſnut, about thirteen inches ſquare, which, in the year 1726, was put down as a hanging poſt for a gate, and carried the gate, without alteration, fifty-two years, when, upon altering the incloſures of the farm, where it ſtood, it was taken up under my direction, and, appearin to be perfectly ſound, was put down for a clapping-poſt in another place.

In 1743, a large barn was built with ſome ofthis timber, and is now as ſound in every part, beams, principals, and ſpars, as when firſt the barn was built: about the ſame time ſeveral Cheſnut poſts and rails were put down, which I have ſince ſeen removed; and, after ſtanding thirty or forty years, generally appeared ſo ſound, as to admit of being ſet up in ſome other place.

The laſt inſtance I ſhall mention, though not of long date, will ſhew the great ſuperiority of this timber over oak in fences. In the year 1772, the preſent Mr. Windham made a large plantation in his park, which was fenced with poſts and rails, converted from young oaks and cheſnuts of the ſame age and ſcantling, ſuch as were picked out of a place where they ſtood too thick. Laſt year, upon Mr. Windham's enlarging this plantation, it was neceſſary to remove this fence; when the Cheſnut poſts were found as ſound as when they were firſt put down, but the Oak were ſo much waſted juſt below the ſurface of the ground, that they could not be uſed for the ſame purpoſes again, without the aſſiſtance of a ſpur to ſupport them.

To theſe modern proofs of the utility and durability, we may join the authority of Evelyn, an author of eſtabliſhed reputation, who aſſerts, it is good for "mill-

"timber and water-work, and that great "part of our ancient houſes in the city of "London were built with it, and that "it does well for table and other furniture."

As a candid quoter of Evelyn however, I admit that he ſays, in another place, that he "cannot celebrate this tree for its ſincerity; it being found (contrary to Oak) "it will make a fair ſhow outwardly, when "it is all decayed and rotten within; but "that this is in ſome ſort recompenſed, for "the beams have the property of being "ſomewhat brittle, of crackling, and "giving warning of danger."

To account for this drawback in Mr. Evelyn's opinion, it will be proper to obſerve, that this certainly is the caſe with old Cheſnut, that has been ſuffered to ſtand beyond the time of its attaining its full growth: it is then the worſt of all timber, being more brittle and more apt to crack, and fly into ſplinters than any other: but I have never known this to be the caſe with young Cheſnut; and therefore, in point of œconomy, it ſhould never be ſuffered to ſtand longer than the points of the branches, and the complexion of the bark, indicate it to be in a growing or healthy ſtate; which is not very difficult to aſcertain, by a perſon accuſtomed to make obſervations upon timber. And it is this very circumſtance, when properly attended to, that makes this timber more profitable than moſt others; for it is ſo early-uſeful, that if it be cut when it ſquares only ſix inches, it will be as durable as an Oak of ſix times its ſize and age. This is in a great meaſure accounted for, by its having ſo little ſap in proportion to other trees, as it will ſeldom exceed in thickneſs the breadth of the bark; whereas the ſap of an Oak will often be from an inch to two inches thick, which is not only uſeleſs, but, if ſuffered to remain, tends very much to the deſtruction of the timber: in other reſpects, the duration of the Cheſnut may be accounted for, from its being leſs affected by worms or inſects, than other timber; otherwiſe it would be impoſſible that ſuch roofs as King's-College, Cambridge, built in the reign of Henry VI. with Cheſnut, and many other equally ancient buildings, ſhould have laſted ſo long, and be ſtill in ſuch a perfect ſtate as many of them are.

Therefore, like Mr. Majendie, I earneſtly wiſh to ſee the culture of this moſt valuable plant, extended over every part of the kingdom, as it muſt prove highly beneficial to the public.

But let no one be afraid of cutting it too young; for, let this tree be ever ſo ſmall, if it is large enough for the purpoſe for which it is wanted, it will be the leſs liable to decay, from its youth; and, if underwood be the object, the proverb, in Beech countries, will be fully verified, "Cut wood "and have wood."

I am, SIR,

Your obedient humble ſervant,

NATHANIEL KENT.

Ripon-Hall,
(Near Aylſham,) Norfolk,
January 16, 1792.

The GOLD MEDAL, being the Premium offered for planting the Upland or Red Willow, before the end of April, 1789, was adjudged to WILLIAM PATTENSON, of Ibornden, in Biddenden, Kent, Eſq. from whom the following Papers were received. See Vol. IX. page 200.

SIR,

THE Society for the Encouragement of Arts, Manufactures, and Commerce, having offered a Gold Medal for the planting of Upland or Red Willow, not leſs than three acres, I hereby take the liberty of acquainting the Society that, in in the year 1785, I planted about a quarter of an acre of dry land with Willow. I ſent to a nurſeryman who had raiſed Willows for many years, for ſome Upland-Willow plants. He ſent them by the name of the Scotch Red Willow, and aſſured me it was the beſt kind of Willow he knows. I think this is not the ſort that is generally called the Red Willow, but it is undoubtedly an Upland Willow, and is nearly, I believe, the ſame as the twelfth ſort, deſcribed by Miller, in his abridged Dictionary, fourth edition, 1754, which he there calls the *Mountain* Willow. This ſmall plantation made ſo fine and advantageous an appearance, that it encouraged me to proceed on a larger ſcale; and, in the ſpring, 1789, I finiſhed two plantations with the ſame ſort of Willow, one thouſand ſeven hundred and forty-two plants on an acre. One plantation contains three acres and a half, the other four acres: they are ſecured by a proper fence, and the plants are in a growing ſtate: the firſt ſummer they grew very well; the ſecond year they ſhot from eight to eleven feet in height. Since I made the plantation, ſeveral perſons in my neighbourhood have planted the ſame kind of Willow in ſmall quantities; and one gentleman is now making a plantation of two acres and a half with it.

If the Society, on this occaſion, think me deſerving their attention, I ſhall eſteem myſelf highly honoured, and am their

Moſt obedient humble ſervant,

WILLIAM PATTENSON.

Ihornden, in Biddenden, Kent,
March 11, 1791.

WE whoſe names are underſigned, live in the pariſh of Biddenden, and certify the above facts.

JOHN MATHER, Rector.
THOMAS KIRKBANK, Curate.
R. PULLEN, jun. &c.

In the Ninth Volume of theſe Tranſactions, page 38 to 44, is inſerted an Account given by SAMUEL DUNN, Eſq. of an Experiment made on one acre and a half of Land, which was cultivated by him with Potatoes, inſtead of lying under a Summer Fallow; and the Society having this year received the following Account from Mr. DUNN, ſtating the advantages reſulting from that practice, the SILVER MEDAL was voted to him for theſe communications.

DEAR SIR,

I READILY comply with the wiſh of the Society, that I would inform them of the quantity and value of the Wheat which grew upon the acre and a half of land that I ſet with Potatoes in the ſpring of 1790, inſtead of having a ſummer fallow to kill weeds and quick graſs, as I had been adviſed to do; and which Wheat was ſown on that ſame land from whence the Potatoes were taken in the month of October following, with only one ploughing, and no freſh manure.

The account will, I doubt not, be very pleaſing to the Society, as well becauſe of its extraordinary value, as that it will further prove how beneficial the growth of Potatoes is, and the eaſieſt and moſt advantageous way of bringing land into order, when filled with noxious weeds, as mine was.

The Wheat has been all threſhed out, and meaſured under my own inſpection, and produced eight quarters and a half of clean Corn.

	£.	s.	d.
Six quarters, ſold for ſeed, at 44*s*.	13	4	0
Two quarters and a half more, not ſold, 14 buſhels of which we kept for our own ſeed (the			

price

	£.	s.	d.
price of wheat is fallen): therefore ſay, at 41*s.* — —	5	2	6
Hinder ends from ditto, 2 buſhels, at 3*s.* — —	0	6	0
Straw from do. 16 threave, at 1*s.* 6*d.* — —	1	4	0
Short ſtraw from ditto, worth	0	5	0
	20	1	6

Expences attending the growth of the Wheat, &c.

	£.	s.	d.
Ploughing an acre and a half of land — —	0	5	3
Paid for ſeed — —	1	6	6
Sowing and harrowing —	0	4	0
Weeding — —	0	2	8
A boy to guard the wheat from the birds, 30 days, at 4d. — —	0	10	0
Reaping the corn, being very thick grown and ſtrong			

	£.	s.	d.
corn, two men, two days, at 2s.	0	8	0
Waggon, horſes, and men, to bring it home	0	4	9
Threſhing 15 days in harveſt time, at 2s.	1	10	0
Dreſſing the corn	0	2	3
Rent for one year, at 20s. per acre, being the moſt it has been let for, though worth more	1	10	0
Taxes on ditto, about	0	3	10
Total	6	7	3

This ſum, deducted from the total value as above, leaves thirteen pounds fourteen ſhillings and threepence, clear profit, the rent and taxes being accounted for.

I muſt beg leave further to obſerve to the Society, that this experiment of mine, made in ſome degree under their ſanction, will appear to have completely anſwered the end propoſed: the land is freed from the weeds and the quick graſs, with which it was overrun; the owner of it is very much benefited, in point of profit; and the country farmer convinced at leaſt, if not informed, that this method of tillage may very prudently be practiſed in future. I am, with great regard,

Your moſt obedient,
and very humble ſervant,
SAMUEL DUNN.

Adelphi Buildings,
17 *Oct.* 1791.

Mr. MORE.

The Thanks of the Society were given to Mr. THOMAS ROGERSON, of Narborough, for the following Communication relative to the comparative advantage of the Drill and Broad-caſt Method in the Culture of Wheat.

SIR,

HAVING been honoured laſt year by the Society for the Encouragement of Arts, Manufactures, and Commerce, with a Medal for drilling the greateſt quantity of land, (See Vol. IX. p. 25), it does not appear to me that I can make any claim this year (having reaſon to believe that ſome of my neighbours have drilled a larger quantity than myſelf): ſtill I am deſirous of laying before the Society, the following account; and ſhould it prove the leaſt worthy their attention, I ſhall eſteem it an honour conferred on me.

I obſerved in my laſt year's account of drilling, that, in a field containing forty-eight acres, I drilled part thereof, viz. twenty-one acres, and ſowed broad-caſt the remaining twenty-ſeven acres, and that I had made a ſmall compariſon of the difference of the Crops, which proved in favour of the drill; and on thraſhing of each ſtack, it proved as follows:

				Per Acre.		
	Load	Comb		Comb	Buſh.	Pecks.
Drill 21 acres, produce	4	18	about	4	3	0
Broad-caſt 27 acres	5	7	——	4	0	2¼
				0	2	1¾
To which add 1 buſhel per acre difference in ſeed ——			——	0	1	0
In favour of the Drill				0	3	1¾

In the year 1791, I drilled only four hundred and fifty-one acres, including two hundred and two acres of Wheat, drilled in 1790. It being the laſt year of my term in the Narford farm, my ſucceſſor had a right to ſow ſmall ſeeds with the ſummer corn-crop; and he wiſhing to ſow them broad-caſt immediately after the drill, prevented my drilling the quantity I otherwiſe intended, as I muſt have been deprived of hoeing: therefore for that reaſon I preferred broadcaſt.

The two hundred and two acres of Wheat I drilled in a variety of ways, viz. one field containing ſixty acres of light ſoil, on a one-year's layer, as follows: part manured with dung, ploughed one earth, and drilled with ſix pecks per acre; part thereof top-dreſſed with rotten dung at the time of drilling; one other part ploughed, one earth top-dreſſed, and the dung drilled in with the roller, and ſowed broad-caſt with two buſhels per acre; the remainder of the field was dunged, ploughed one earth, and ſowed broad-caſt with two buſhels per acre. The ſummer proving remarkably dry, the top-dreſſing appeared to be of little uſe: that part of the field where the manure was ploughed in and drilled with the machine, was by far the beſt crop: the whole field was well hoed by hand, with double triangular hoes (the drill-rolled wheat excepted), which I prefer to horſe-hoeing on very light ſoils, as they enter the earth ſufficiently deep both for the benefit of air and moulding-up the Corn; and the perſon who uſes them, can cut away many weeds which ſtand too near the rows of Corn for the horſe-hoe: beſides, I have often remarked, after horſe-hoeing, ſome of the light fields in which it ſinks deep, and raiſes ſo much mould as to nearly cover the blades of the Corn, that heavy ſhowers of rain have followed, which has drabbled the Corn, made it turn yellow, and injured it much.

One hundred and forty-two acres being the remainder of the Wheat drilled, was part after wheat, part after barley, and part after oats, ploughed only one earth, and without manure, drilled with ſix peeks per acre, and all either ſcarified or hoed;

and as the ſeaſon proved unfavourable for our light ſoils, it was a better crop than I could have expected from ſummer Corn, ſown with the ſame proſpect.

The remaining two hundred and forty-nine acres of drilled Corn, conſiſted of Barley, Oats, Peas, and Tares. What was drilled early, was a tolerable crop; but that drilled late (viz. May), was very indifferent. I therefore recommend early drilling, eſpecially on light ſoils, that the Corn may be hoed in proper time, and the rows meet before the dry weather affects it too much.

The Tares were drilled on Pea ſtubble, the beginning of April, at nine inches, with two buſhels per acre; and, by ſcarifying them the latter end of April, and hoeing them twice in May, they grew faſt, and proved a great relief to my horſes during the Turnep-ſowing ſeaſon, when I cut them and fed my horſes in the ſtables.

Since Michaelmas 1791, on the farm I now occupy at Narborough, I have drilled and ſowed alternately a piece with Wheat, containing nearly eighty acres, thorough ſummer-tilled, part manured with oil-cakes, nearly half a ton per acre, and part teathed with ſheep. I have likewiſe dibbled another field, on a farm in an adjoining pariſh, of one-year layer, part in the common mode, viz. two rows on a flag or furrow; the other part, one row on a flag, at nine inches aſunder.

And I ſhall be happy if they afford me an opportunity of laying before the Society any account that may prove ſatisfactory to them. In the mean time, I remain,

SIR,

Your obliged humble ſervant,

THOMAS ROGERSON.

Narborough,
January 29, 1792.

Mr. MORE.

The GOLD MEDAL, or the SILVER MEDAL and TWENTY GUINEAS, at the option of the Candidate, being offered for the beſt Set of Experiments to aſcertain whether it is moſt advantageous to cultivate Wheat by ſowing it in the common Broad-caſt way, or by Drilling it; the Premium was this year adjudged to Mr. PETER SMITH, of Hornchurch, Eſſex; whoſe Letters are here inſerted, and who made choice of the Silver Medal and Twenty Guineas.

SIR,

HAVING heard much ſaid in favour of Cooke's Drill and Horſe-hoe, I was determined to make a comparative Experiment on a twelve-acre Piece, one half of which was drilled, the other half ſown broad-caſt. In June, 1790, the above piece, a mixed ſoil or gravelly loam, was ploughed one furrow from a two-years graſs layer, and ſown with Turneps. The Turneps being taken by the fly, I converted the whole twelve acres into a fallow for Wheat, by twice ploughing, three times harrowing, and once rolling. On the 12th of October, the land was meaſured and equally divided; on the 14th, began to ſow broad-caſt under furrow, with the uſual quantity of this country, viz. two buſhels and a half per acre (our buſhel is eight gallons and three quarts meaſure): on the 15th, finiſhed the broad-caſt: the two following days, the ſix acres intended to be drilled, were ploughed (in order to give both an equal quantity of work) into lands nine feet ſix inches wide, a proper width for Cooke's Drill, and drilled accordingly, a few days after, with one buſhel per acre of the ſame meaſure as above. To do the Drill juſtice, I muſt obſerve that the young plants ſuffered very much from the rooks picking the grain out of the drill, which left ſo thin a plant, that ſome of my neighbours went ſo far as to ſay, I ſhould have no crop: it was alſo, I believe, injured, one acre in ſix, by a leading land-ditch ſtopping, which overflowed that part of the field with water for ſome time, and being directly acroſs the lands, hindered me from ſcarifying ſo ſoon as I would have done.

During the Winter, the broad-caſt had by a great deal the beſt appearance; but in a little time, after the drilled Wheat was ſcarified, which was done the ſecond week in March, it evidently got the lead, being then of a darker green, and more healthy colour. In April the drilled Wheat was horſe-hoed; at the ſame time the broad-caſt was hand-hoed; and in May the drilled Wheat was hand-hoed, as at that time I had not a drill of my own, nor could I at that time borrow. The drilled now beat the broad-caſt much; it tillered well: I told from twenty to thirty ſtems from a ſingle plant with wonderful ears, containing from ninety to one hundred kernels in one ear. The broad-caſt became ripe firſt; but both were cut at the ſame time, that is, the ſame men cut the drilled immediately after it: the broad-caſt was carted two days before the drilled; but both were got without any rain, and laid in the ſame barn, with a layer of drag rakings between them, in order to threſh them ſeparately.

Both crops were threſhed by the ſame men with great exactneſs. The produce of the ſix acres drilled, was twenty-five quarters, ſix buſhels; the produce of the broad-caſt, twenty-four quarters, one buſhel and a half. Produce of the drill per acre, thirty-four buſhels, one peck, and four quarts; produce of the broad-caſt per acre, thirty-two buſhels, one peck: that is, two buſhels and four quarts in favour of the drill, which, with one buſhel and a half of ſeed ſaved, is three buſhels and a half and four quarts, which may be eſtimated at about twenty ſhillings per acre, in favour of the drill. This, though conſiderable, is but trifling, compared with the benefit the land has received from being ſcarified and horſe-hoed, which was very viſible when the crops were cut, the drilled ſtubble being very clean, and the broad-caſt foul.

The expence in the cultivation of the two crops was nearly the ſame. The drilled Wheat was once ſcarified, and once horſe-hoed, at eight-pence per acre each time; alſo hand-hoed at three ſhillings and ſix-pence per acre. The broad-caſt was hoed at five ſhillings per acre. I muſt here obſerve, that it is not uſual to hand-hoe broad-caſt Wheat in this part of the country, though practiſed in ſome parts; but, in order to be ſatisfied and to make up my mind about drilling, I determined to run the drill hard, by doing what I could to the broad-caſt; and I am decidedly of opinion, that if I had not hoed the broad-caſt, and if the drill had not ſuffered by the rooks, and by being overflowed with water as before mentioned, the drill would have beat the broad-caſt at leaſt one fourth part; and, as the beſt proof I can give of my opinion as above, I have drilled all my Wheat, viz. forty acres.

If this ſtatement of my experiment ſhall meet with the approbation of the Society, it will afford much pleaſure to

Your moſt obedient,
humble ſervant,
PETER SMITH.

Hornchurch, Eſſex,
Feb. 5, 1790.

Mr. MORE.

The GOLD MEDAL, being the Premium offered for an Account of the comparative Advantages of the Drill and Broadcaſt Methods in the Cultivation of Turneps, was adjudged to Mr. WILLIAM DANN, of Gillingham, Kent (ſee Vol, IX, page 202), from whom the following Papers were received,

SIR,

PRESUMING, by the Society's continuation of the Premium for the comparative advantage of the Drill or Broadcaſt Method in the Cultivation of Turneps, that they are not ſatisfied on the ſubject, I am induced to requeſt you will do me the favour to lay the following before them; and if it ſhould in the leaſt tend to clear up a doubtful point in their minds, it will give great pleaſure to, SIR,

Your moſt obedient ſervant,

WILLIAM DANN,

Gillingham,
March 27, 1791.

Mr. MORE,

Comparative

Comparative Culture of Turneps.

Seven acres of thin, light, ſtony land, on a chalk bottom, worth about eleven or twelve ſhillings per acre, were prepared, principally in May and June, 1790, for Turneps, by four ploughings, with proper harrowing and rolling. After the ſecond ploughing and working, a conſiderable quantity of graſs was raked up by hand, carted together and burnt, which, and the earth that was collected with it, produced almoſt twenty-four cart-loads (of twenty-five buſhels each) of aſhes: theſe were ſpread over about four of the ſeven acres. After the third ploughing, harrowing, &c. two hundred and thirteen loads of compoſt manure were carried out, and ſpread over the whole of the ſeven acres, making a difference of three or four loads leſs per acre on that part where the aſhes were ſpread: it was then ploughed the fourth time, and finiſhed the 7th of July. It rained the 5th and 6th; and, on the 8th, when the ground was juſt dry enough to roll properly, I had it rolled with a light roller; ſowed three acres in the common broadcaſt method, with five quarts of ſeed; and drilled the remainder with four quarts of ſeed, the drills at ten inches and a half aſunder: the whole was then harrowed once, and the light roller again drawn over it, which made the earth properly fine.

But as I conceived it probable that the aſhes might have an effect on the Turneps, I ſowed the field in ſtripes, giving to each a part of the ground on which they were ſpread, that each might partake of the advantage, if any.

The weather being ſhowery for ſeveral days after they were ſown, there was no viſible difference in their coming up: indeed none in that caſe was to be expected; for it is not in ſuch ſeaſons, I conceive, that the Society, or others, ſuppoſe any great benefit will ariſe from the drill, with reſpect to the early appearance of the plants, but more particularly in dry ſeaſons, when, in the broad-caſt method, the plants ſuffer from not having ſufficient hold or depth in the ſoil; while thoſe drilled, by having proper hold or depth in the ſoil, will flouriſh; yet even then the regular diſtribution of the ſeed, is, in my opinion, an object worth the practice of the Drill Syſtem.

The plants were up in general by the 15th of July, between which time and the 30th, I frequently obſerved them, but could perceive no difference in their appearance. About half an acre (part of each) was materially injured by the wire or red worm, which I have very frequently ſuffered by.

Auguſt the 5th, harrowed them; the 6th, began to hand-hoe them: from the moiſt weather, the broad-caſt were ready as ſoon as the drill, the reverſe of which I have

I have heretofore found in dry ſeaſons, by ſeveral days. The weather had been cold and unkindly from the time they were ſown; otherwiſe I have no doubt they would have been ready for hoeing much ſooner. The 10th, finiſhed hoeing at ſix ſhillings an acre, at which the labourers earned near five ſhillings a day (certainly no great proof of œconomy or oppreſſion). I purpoſe in future drilling at twelve inches inſtead of ten inches and a half; when I have no doubt of having them hoed from four to five ſhillings per acre. The general practice here is to hoe but once, which probably may be wrong. I have not yet perceived any difference in the plants where the aſhes were ſpread.

On the 24th, I firſt perceived a difference in favour of the drilled crop; and, on the 6th of December, to prove the compariſon, I weighed ten perches, five of the broad-caſt and five of the drilled, at different parts of the field, as nearly equal as poſſible, the ſame number of each being adjoining, except a few feet on the edge of each ſtripe, to avoid error, and found as follows:

Broad-caſt.		*Drilled.*	
No.	lb.	No.	lb.
1 weigh^{d}	243	1 weigh^{d}	264
2 ——	298	2 ——	276
3 ——	272	3 ——	303
4 ——	286	4 ——	291
5 ——	246	5 ——	296
	1345		1430
			1345
		5)	85

Diff. per Perch, 17lb.

	Ton	Cwt.	Qrs.	lb.
Per Acre drilled	20	8	2	8
Ditto broad-caſt	19	4	1	4
Diff. per Acre	1	4	1	4

N.B. There has been no viſible difference in the Turneps, where the Aſhes were ſpread.

I here beg leave to ſtate the reſult of a ſecond experiment, with a view of endeavouring to give the Society further information on the comparative culture of Turneps, drilled and broad-caſt.

The 17th of July 1790, I repeated the experiment on near ſeven acres more, that had been prepared nearly as in the caſe before mentioned, except that no graſs had been burnt, and of courſe no aſhes ſpread, but on better land, being a good friable ſandy loam, worth ſeventeen or eighteen ſhillings an acre: after the third ploughing it was manured with thirty-three loads of dung and mould per acre, moſt part of the dung brought from London, by water (which I found too expenſive to continue): it was then ploughed again, and rolled with a light roller, and ſown in ſtripes, as in the other caſe, three acres broad-caſt, and near four acres drilled, harrowed once in a place and left rolled; the ground ſtill moiſt, from frequent ſhowers, but dry enough to work properly. Nearly two quarts of ſeed were ſown per acre, broad-caſt, and one in the drill: moſt of the plants were up in ſeven days, as the ground was worked very fine, and not yet affected by drought; ſo that here alſo no difference appeared in favour of the drill, which, as I before obſerved, is to be expected only in dry ſeaſons, in that particular.

Auguſt 9, I obſerved that the wire-worm had deſtroyed many of the plants in patches;

but moſt on a part that was rather too wet when ploughed; indeed, I have frequently perceived the ground unkindly, ſometimes for ſeveral years, by being ploughed when too wet. The 14th, harrowed thoſe ſown on the 17th of July; and horſe-hoed, croſs the drills, the other part of the field; the whole eleven acres, with Mr. Cooke's hoes, about three inches wide, which are uſed between the drills when at ſeven or eight inches. To bring the compariſon to the teſt, on the 29th of November I ſelected and weighed, at four ſeparate parts of the ground ſown on the 17th of July, eight perch, four of each as impartially as poſſible, and found as follows:

Broad-caſt.		*Drilled.*	
No.	lb.	No.	lb.
1 weigh^{d}	335	1 weigh^{d}	361
2 ——	333	2 ——	360
3 ——	299	3 ——	323
4 ——	311	4 ——	361
	1278		1405
		Broad-caſt	1278
		4)	127
Diff. per Perch			31¾

	Ton	Cwt.	Qrs.	lb.
Per Acre drilled	25	1	3	4
Do. Broad-caſt	22	16	1	20
Diff. per Acre	2	5	1	12

As the produce above ſtated, may be thought great, I beg to obſerve, that the froſt had not then injured the tops.

In a field of three acres, ſown the 7th of July, 1790, I made the following experiment, which perhaps may add to the ſatisfaction of the Society on the ſubject. About half an acre in the middle of the field was ſown broad-caſt; on the one ſide of this, the ground drilled at ten inches and a half, and on the other ſide at nine inches. The 4th of December I weighed one perch of each, and found

	lb.		Ton	Cwt.	Qrs.	lb.
On the Drilled, at 10½ inches,	288	per Acre	20	11	1	20
On ditto, at 9 inches	272		19	8	2	8
On the Broad-caſt -	238		17	0	0	0
The average difference per Acre			3	0	0	0

I fear the Society will think me troubleſome; but I cannot avoid ſaying that, on the 10th of July, 1790, I ſowed broad-caſt half an acre, in the middle of another three-acre field, and drilled on each ſide at ten inches and a half; and, on the 30th of December, had three perch weighed, one of the broad-caſt, and on each ſide one of the drilled: the account given me was as under.

				Per Acre.			
	lb.		lb.	Ton	Cwt.	Qrs.	lb.
The firſt Perch, drilled, weighed -	298	average	307½	21	19	1	4
The ſecond ditto	317			20	15	2	24
The ſecond Perch, broad-caſt			291				
Difference per Perch			16½	1	3	2	8

If what I have ſtated ſhould prove ſatisfactory to the Society, it will give me pleaſure; but much more, if they ſhould have met with an account more agreeable to their ideas, and better deſerving public imitation. I am,

SIR,

Your humble ſervant,

WILLIAM DANN.

Gillingham,
March 27, 1791.

Mr. MORE.

P. S. It was not in my power to attend; but they were weighed by the perſons that aſſiſted me in the other three caſes; and I have no doubt of their account.

The SILVER MEDAL and TEN GUINEAS, being the Premium offered for the beſt Account of Experiments made on at leaſt Six Acres of Land, to determine the comparative advantages of the Drill or Broad-caſt Method in the Cultivation of Turneps, was this year adjudged to Mr. JOHN AMBROSE, of Copford, near Colcheſter, Eſſex, from whom the following Papers were received.

MY LORDS AND GENTLEMEN,

I DO myſelf the honour of tranſmitting you an account of an Experiment I have made to determine the comparative advantages of the Drill and Broad-caſt Method in the cultivation of Turneps, made on two fields, each conſiſting of ſix acres; the reſult of which, I flatter myſelf, will not be unworthy your notice and regard.

In Auguſt, 1790, Barn Field, and a field called Stone Croft (the former of which had produced me a crop of Oats, the latter a crop of Wheat, the preceding harveſt), were both ploughed up. In September I ſowed them with Rye and Tares, for ſpring-food for my Suſſex-down ſheep; and they both produced a great quantity of feed. After the feed was off, each field had four tilthes and a half, and ninety loads of farm-yard and town dung were put upon them: both fields were manured and tilthed alike.

On the 4th of July, 1791, and the following day, Barn-Field was drilled with Turneps, with the Rev. James Cooke's Drill Machine; and, on the 6th, and the following day, Stone Croft was ſown broad-caſt. Both were ſown with Kendle's Round White Stock, which generally run pretty large, if the land is in any thing of heart.

By horſe-hoeing thoſe Turneps that were drilled, with the ſcarificator, (one foot diſtance from row to row) as ſoon as they got their four leaves, they in courſe came ſooneſt ready to be ſet out by the hand-hoe, and always promiſed to be the beſt field of Turneps; yet the other field had a good broad-caſt plant, and was very productive.

The drilled were horſe-hoed twice; once previous to their being hand-hoed, which was done at ſix-pence three farthings per acre each time, the three farthings being an allowance for beer (as our cuſtom is in this country to allow three halfpence in a ſhilling for that purpoſe); and once hand-hoeing, at three ſhillings per acre, and four-pence halfpenny for beer: which makes, for horſe and hand hoeing, and beer, four ſhillings and ſix-pence per acre.

The broad-caſt was twice hand-hoed, at three ſhillings and four-pence halfpenny each time, beer included; which makes the expence ſix ſhillings and nine-pence per acre. Expence of labour ſaved by the drill, is two ſhillings and three-pence per acre: beſides, I find, by horſe-hoeing twice, and hand-hoeing once, the land is better cleaned and tilthed, and the plant vegetates better, than by the more common practice of hand-hoeing twice.

On the 26th of December, 1791, I had ten rods of the drilled Turneps weighed under my direction and ſuperintendance, taking one at the diſtance of every five rods; and, on the 27th, weighed ten rods of thoſe ſown broad-caſt, taken in the ſame manner: both parcels were weighed by the ſame perſons with great accuracy, and produced as follows:

	Drilled.					*Broad-caſt.*			
No.	Ton	cwt.	qrs.	lb.		Ton	cwt.	qrs.	lb.
1	0	2	3	16		0	2	2	20
2	0	3	0	16		0	2	2	12
3	0	3	0	18		0	3	0	15
4	0	3	0	15		0	2	2	25
5	0	2	2	2		0	2	2	15
6	0	2	3	12		0	2	3	2
7	0	3	0	2		0	3	0	15
8	0	3	0	8		0	2	3	15
9	0	2	3	19		0	2	1	27
10	0	3	0	9		0	2	2	23
Total of 10 rods drilled	1	9	3	5	Ten rods broad-caſt	1	7	3	1

	Per Acre			
	Ton	Cwt.	Qrs.	lb.
Weight of the drilled Turneps	23	16	2	24
Weight of the Broad-caſt Turneps	22	4	0	16
Diff. per Acre, in favour of the drilled,	1	12	2	8

	Ton	Cwt.	Qrs.	lb.
Weight of the Six Acres drilled —	143	0	1	4
Weight of the Six Acres broad-caſt —	133	4	3	12
Difference in favour of the drilled in the whole crop — — —	9	15	1	20

Good Turneps, ſuch as theſe crops, will ſell, one year with another (but this year for conſiderably more), for three pounds per acre; which is four-pence halfpenny per rod, or three halfpence per hundred nearly.

	£.	s.	d.
The drilled Turneps have the preference, at the above value per Acre — —	0	4	0¾
Expence ſaved in hoeing and beer — —	0	2	3
Preference in favour of the drilled per Acre —	0	6	3¾
In favour of the Six Acres drilled — —	1	17	10½

The quantity of ſeed ſown, much the ſame, about two pints per acre.

For your further ſatisfaction, I beg leave to inform the Society, that I have drilled Turneps for the laſt two ſeaſons, and this laſt eighteen acres, beſides the ſix acres above mentioned; and alſo grain for the laſt three years. Laſt autumn I had drilled upwards of one hundred and twenty acres of Wheat, which is a very pleaſing and beautiful plant; and I have likewiſe drilled all my peas and beans; and hope the above will afford me an opportunity to make ſeveral experiments, of the ſucceſs of which ſhall be happy in having the honour of tranſmitting you an account at ſome future time. I remain,

My Lords and Gentlemen,
Your moſt obedient
humble ſervant,
John Ambrose.

Copford, near Colcheſter,
April 9, 1792.

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

P. S. The ſoil of the two pieces of land much the ſame, being a good, mixed, middling, dry turnep ſoil, with a rich pliable loam below, very little ſtony, worth about ſixteen ſhillings per acre.

WE, the underwritten, do certify, That Mr. John Ambroſe, of Copford, near Colcheſter, in the county of Eſſex, has made a juſt ſtatement of the experiment, on ſix acres of Turneps, of the Drill and Broad-caſt method of ſowing and growing them; as witneſs our hands, this 9th day of April, 1792,

CHARLES HAYWARD	Miniſter of the Pariſh of Copford.
JOHN BAKER, JOHN POULTON,	Churchwardens.
WILLIAM HAYLES, JOHN CHRISTMASS,	Servants of Mr. Ambroſe, who weighed the Turneps.

The Thanks of the Society were this year voted to Mr. WILLIAM DANN, of Gillingham, in Kent, for his Account of Turneps and Wheat, drilled by him, as mentioned in the following Letter.

And Mr. DANN appearing as a Candidate for the Premium, the GOLD MEDAL, or TWENTY GUINEAS, offered for feeding Cattle and Sheep with Potatoes, in the year 1790, the ſaid Premium was adjudged to him; when Mr. DANN was pleaſed to make choice of the Honorary Reward, as appears by his Letter annexed.

SIR,

I RECEIVED your letter of the 30th ult. with the Ninth Volume of the Tranſactions of the Society for the Encouragement of Arts, Manufactures, and Commerce, on the 9th inſt. and beg you will do me the favour to preſent my moſt grateful acknowledgements to the Society for this further mark of their approbation. Permit me to add, that I have this year drilled the whole of my Turneps, which, notwithſtanding the unfavourableneſs of the ſeaſon, have flouriſhed beyond my moſt ſanguine expectation.

And I beg leave to ſay, that I have this year alſo made an experiment on half an acre of Wheat, drilled at ſeven inches, and half an acre ſown broad-caſt, adjoining, with exactly the ſame ſoil and cultivation, and found a difference in favour of the drilled, of two buſhels and ſix quarts per acre. With the greateſt reſpect for the Society, I remain,

SIR,

Your obliged and obedient ſervant,

WILLIAM DANN.

Gillingham,
September 11, 1791.

Mr. MORE.

SIR,

THE Society for the Encouragement of Arts, Manufactures, and Commerce, having offered a Premium for the Cultivation of Potatoes for feeding Cattle and Sheep, in the year 1790, I am induced to tranſmit you the following account, which I requeſt you will do me the favour to lay before them; and am,

SIR,
Your moſt humble ſervant,
WILLIAM DANN.

Mr. MORE.

The Land under mentioned, was cultivated with Potatoes in the year 1790.

No. I.

Two acres, part of Little Court-Field, a ſandy loam, that was once ploughed in the winter, harrowed in the ſpring, and and twenty cart-loads of ſhort rotten dung ſpread over it. Furrows were then drawn with a plough, to receive the ſets which were dropped in, and the ground harrowed on the 20th and 21ſt of April: the expence and produce were as follows.

Expence per Acre.

	£.	s.	d.
Rent — —	0	18	0
Ploughing, harrowing, and furrowing — —	0	15	0
Ten loads of rotten dung —	1	0	0
Twenty-two buſhels of ſeed	1	2	0
Cutting ditto, at 2*d.* per buſhel	0	3	8
Dropping ſets — —	0	7	0
Hoeing by hand, once —	0	3	0
Once hoeing and earthing with a horſe — — —	0	4	0
Tithe — —	0	7	0
Rates and fences — —	0	4	6
	5	4	2
The ſame for the other acre	5	4	2
	10	8	4

Produce, 687 buſhels, which were dug up by hand, between the 18th and 22d of October;—a bushel weighed 73lb.

N.B. The expence of digging, picking up, carting home, and ſtowing away (in a barn), will be brought to account at the concluſion. This part was clean, and in proper order for any crop.

No. II.

The remainder of Little-Court Field, two acres and three quarters, which was in a foul ſtate, and intended for Turneps: the ſoil different, a tolerably good mould, with many ſtones. It was ploughed in the autumn, harrowed in the ſpring; and twenty-two loads per acre of long dung were ſpread over it, which I conceive is preferable to the rotten dung, for Potatoes.

Expence per Acre.

	£.	s.	d.
Rent — —	0	17	0
Tithe-rates and fences —	0	11	6
Carried forward	1	8	6

	£.	s.	d.
Brought forward	1	8	6
Ploughing in the autumn, and harrowing in the ſpring —	0	10	6
Spreading the dung, ploughing when planted, and planting	0	11	6
Twenty-two loads of dung, at 1*s.* 4*d.* — —	1	9	4
Hoeing by hand, twice —	0	8	0
Horſe-hoeing and earthing, once each — —	0	4	0
Seed and cutting, as before	1	5	8
	5	17	6
The ſame for one acre and three quarters more — —	10	5	7½
	16	3	1½

Produce, 1298 buſhels, dug up between the 22d and 26th of October.

I beg leave to obſerve, that the cheapeſt and moſt expeditious method of planting (and I have tried ſeveral), is two ploughs following each other, the horſes not going in the furrow, which wait at the ends till the ſeed is dropped in. I find, four women and four children are ſufficient to drop after the two ploughs, which, as they return, of courſe cover the ſets, and leave a freſh furrow open for the next row: the rows are about twenty-two inches from each other: by this method I plant two acres and a half in a day, and at the expence of eleven ſhillings and ſix-pence per acre. A proper opportunity, after planting, ſhould be taken, to draw a harrow over the ground; which expence, I obſerve, I have omitted to bring forward above.

No. III.

Three quarters of an acre, part of Court Dale, that had been laid down three years with Lucerne, which was deſtroyed by rabbits; on which ſpread fourteen loads of dung on the ley, previous to ploughing, and planted with Potatoes the 24th of April.

Expence.

	£.	s.	d.
Rent, tithe, rates, and fences	1	2	1½
Dung — —	0	18	8
Ploughing (very hard work), ſpreading dung, and planting — —	0	15	0
Thirteen buſhels of ſeed, and cutting — —	0	15	2
Hoeing by hand, twice —	0	8	0
	3	18	11½

Being a ley, could not horſe-hoe ſo well as elſewhere.

Produce, 196 buſhels, dug up the 29th and 30th of October: the crop here was at no time promiſing; being, as I conceive, planted too deep.

No. IV.

Two acres one rood and twenty perches, part of Court Field: the ſoil tolerably good mould, but ſtony, on a chalk bottom, intended for turneps, but not ſo graſſy as No. II. It was ploughed once in the winter, and afterwards treated the ſame as No. II. and planted on the 29th of April.

Expence per Acre.

	£.	s.	d.
Rent — —	0	16	0
Tithe, rates, and fences —	0	11	6
Ploughing in the winter, and harrowing twice —	0	11	0
Twenty-two loads of dung	1	9	4
Spreading ditto, ploughing when planted, and planting —	0	11	6
Seed, 22 buſhels, at 1*s.* and cutting ditto, at 2*d.* per buſhel	1	5	8
Hoeing by hand, twice —	0	8	6
Horſe-hoeing and earthing, once each — —	0	4	0
	5	17	0
The ſame for one acre one rood twenty perch more —	8	0	10½
	13	17	10½

Produce, 877 buſhels, dug up the 26th, 27th, and 28th of October.

No. V.

Two acres computed, other part of Court Field; a good ſandy loam, planted between the 3d and 8th of May, amongſt hops; two rows of Potatoes between each row of hops: no ploughing here of courſe, nor charge for manure, as the ground was dug on account of the Hops, and no manure applied. The whole expence incurred in conſequence of the Potatoes, was drawing furrows with a plough, dropping in the ſeed, and covering it with the hoe by hand.

But, leſt I ſhould miſlead others, I beg to obſerve, that the Potatoes certainly injured the Hops; ſo much, that it was perceivable at a conſiderable diſtance. The Hops were of a much paler colour, where the Potatoes were planted, and I have no doubt but the produce was much leſs thereby: for which reaſon, I will charge the rent to the Potatoes.

Expence per Acre.

	£.	s.	d.
Rent	0	18	0
Tithe, rates, and fences	0	11	6
Drawing furrows, planting, and covering	0	12	0
Seed, and cutting, as before	1	5	8
Hoeing by hand, once	0	3	0
Horſe-hoeing and earthing, once each	0	4	0
	3	14	2
The ſame for the other acre	3	14	2
	7	8	4

Produce, 674 buſhels, dug up the 30th of October, and the 1ſt and 2d of November.

No. VI.

Part of Great Court Field. April the 30th, planted ten rows of Potatoes, between twenty rows of beans that were drilled at about twenty-one inches. The beans were good; of courſe the Potatoes deprived of proper air, and the produce, as I expected, not worth digging.

RECAPITULATION.

No.	Quantity of Ground.			Expence.			Produce.
	A.	*R.*	*P.*	£.	*s.*	*d.*	Buſhels.
I.	2	0	0	10	8	4	687
II.	2	3	0	16	3	1½	1298
III.	0	3	0	3	18	11½	196
IV.	2	1	20	13	17	10½	877
V.	2	0	0	7	8	4	674
Total	9	3	20	51	16	7½	3732
MyBailiff's account for digging, picking up, carting home, & ſtowing away				27	10	7	
Total Expence				79	7	2½	

OBSERVATIONS.

By this account, it appears that the prime coſt of the Potatoes was £.1 : 12*s* : 2½*d*. more than 5*d* per buſhel; but the whole charge of the manure is included, the half of which might very fairly be carried to ſucceeding crops, and would conſequently reduce the price greatly. They were cultivated with the ſole view of feeding Cattle and Sheep with them; but, for the reaſons hereafter ſtated, about a tenth part were ſold.

The Potatoes were applied as follows.—To Seventeen Bullocks.

	When bought.	When ſold.	Days kept.	Expences of keeping, at 11*d.* per day.			Prime-coſt.			Sold for			Gain by each.		
No.	1790	1791		£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*
1	Nov. 8	Mar. 24	136	6	4	8	17	16	6	25	4	5	7	7	11
2	do.	Feb. 24	108	4	19	0	15	11	6	20	9	7	4	8	1
3	do.	Mar. 3	115	5	5	5	15	11	6	21	13	7	6	2	1
4	do.	Apr. 1	144	6	12	0	14	6	6	21	15	2	7	8	8
5	Dec. 11	Mar. 10	89	4	1	7	16	11	6	20	9	7	3	18	1
6	do.	—— 17	96	4	8	0	18	1	6	23	14	5	5	12	11
7	do.	Apr. 22	132	6	1	0	16	11	6	22	7	8	5	15	8
8	do.	—— 8	118	5	8	2	16	1	6	20	17	7	4	16	1
9	do.	—— 15	125	5	14	7	16	1	6	19	16	4	3	14	10
10	Oct. 30	Mar 25	146	6	13	10	11	0	6	19	13	7	8	13	1
11	Nov. 27	Jan. 19	53	2	8	7	14	11	6	16	10	0	1	18	6
12	do.	do.	53	2	8	7	13	0	0	15	0	0	2	0	0
	1791														
13	Jan. 22	Apr 22	83	3	16	1	19	11	6	24	2	0	4	10	6
14	do.	do.	83	3	16	1	19	11	6	24	11	6	5	0	0
			1481	67	17	7	224	8	6	296	4	11	71	16	5

OBSERVATIONS.

Each Ox eat one buſhel and a half of Potatoes a day, which I value at 6*d.* per buſhel, and eight pounds of hay, value 2*d.* together 11*d.* a day. No. 9 was very poor when bought; from which I conclude that Cattle, put to Potatoes in a low ſtate, will not pay ſo well as when they are a little forwarder in fleſh.

The following is ſuppoſed profit, as they were part of my own Stock; the firſt a Heifer, the other two working Oxen, very poor, put up for experiment, to prove if Potatoes would anſwer for Oxen in that ſtate. I think they do not; for, according to my eſtimate, they did not pay more than £.4 : 10s. each, for keeping 134 days.

	When bought.	When ſold.	Days kept.	Expence of keeping at 11*d.* per day			Prime-coſt.			Sold for			Gain by each.		
No.				£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*	£.	*s.*	*d.*
15	Nov. 1	Jan. 12	73	——			——			——			2	10	0
16	Dec. 28	May 10	134	——			——			——			4	10	0
17	do.	do.	134	——			——			——			4	10	0

Total days kept - 1822 which, at 1½ buſhel, is 2733 buſhels eat by Bullocks.

OBSERVATIONS.

The Potatoes to both Sheep and Oxen were given unwaſhed, but the earth was moſtly rubbed off from them, when they were picked up; and ſome were cut for the Sheep.

I alſo put up ſix four-years-old Wiltſhire Wether Sheep to Potatoes, on the 18th of November, 1790, and gave them no other food. It was near three weeks before they would eat them: they eat the thatch from the ſhed within their reach, and the ſtraw they were littered with, rather than the Potatoes; by which of courſe they were worſe at the expiration of that time, than when firſt put up; and therefore I make no charge for Potatoes till fourteen days after. I ſold them the 26th of March, 1791, at full ten ſhillings each more than they would have ſold for when put up. Each eat about eight pounds per day, which, for 114 days, the time they were up, is equal to about ſeventy-five buſhels. The whole conſumed by the above, is two thouſand eight hundred and eight buſhels, which is all that were given to Cattle or Sheep, that I can ſtate a profit on with any preciſion.

The remainder were given to my working Oxen, Cows, Horſes, &c. except three hundred and ſixty-ſeven buſhels, that were ſold late in the ſpring, and three hundred and twenty buſhels that I had cut to plant.

Having obſerved that Turneps, when they remain on the ground longer than about the middle of March, generally prove injurious to the ſucceeding crop, particularly if the ſpring ſhould be a dry one, I reſerved a few hundred buſhels of Potatoes for my Ewes and Lambs, after the Turneps were finiſhed, which I intended ſhould have been by the time above mentioned (for the purpoſe of ſowing Barley early, as well as the reaſon before ſtated); but the winter proving ſo uncommonly mild, the Turneps afforded ſuch an abundance of feed, that I was not able to get them conſumed until the middle of April, when the graſs and clover were ſo very forward, that it would have been highly improper to have kept

kept Sheep on Potatoes. However, I ſhall not loſe ſight of the idea for future practice.

A much greater immediate profit would no doubt ariſe, by ſelling the Potatoes, than by feeding Cattle with them; but the manure that is made thereby, is, I conceive, nearly equal to the difference, and ſhould be the grand object with every farmer.

HAVING read Mr. Dann's Account of his cultivation of Potatoes, for the purpoſe of feeding Cattle, I do hereby certify, That I believe the ſame to be ſtrictly true, as witneſs my hand,

HOUST. RADCLIFFE,
Vicar of Gillingham, Kent.

I DO hereby certify, That Mr. William Dann, of Gillingham, in Kent, cultivated nine acres three roods and twenty perches of land with Potatoes, in the year

1790; and they were applied as he has ſtated in an account which I have read, that he intends to ſend to the Society for the Encouragement of Arts, &c. in claim of the Premium they have offered for feeding Cattle and Sheep, viz.

		Buſhels.
To 17 Bullocks	—	2733
6 Sheep	— —	75
Horſes, Oxen, Cows, &c.		237
For feed	— —	320
Sold	— —	367
Total	—	3732

JOHN CARMAN,
Bailiff to Mr. Dann.

Gillingham,
Oct. 19, 1791.

SIR,

I HAVE read Mr. Dann's account of his cultivation of Potatoes, for the purpoſe of feeding Cattle, and do certify, That I attended at the planting, and was an eye-witneſs of their effects on the Oxen fatted with them; and muſt declare, that I never ſaw beaſts fatter than they were. I alſo eat of the beef, which was as good as I ever taſted. I beg leave to obſerve, that my reaſon for paying ſuch particular attention to the effects of the Potatoes cultivated by Mr. Dann, in the year 1790, was in conſequence of experiments he had made for two or three years on a ſmaller ſcale, which gave every reaſon to hope that they would be of infinite advantage as a winter food for ſtock; and I am ſo well ſatisfied with what I have ſeen of the effects of the Potatoes, that I have near two acres of them now digging up, for the ſole purpoſe of feeding my Milch Cows in the winter. I have the honour to be,

SIR,

Your very humble ſervant,

B. DOUGLASS.

Gillingham, Kent,
20 *Oct.* 1791.

Mr. MORE.

SIR,

I RECEIVED your letter of the 24th, written by the deſire of the Society, and have, agreeable to the requeſt, looked at the copy of the account I ſent you reſpecting feeding Cattle and Sheep with Potatoes; and find the expence of keeping ſtated at £.67 : 17*s* : 7*d*. But ſuffer me to ſay, the charge is high, viz. 6*d*. per buſhel for the Potatoes, which, give me leave to obſerve, is near a penny per buſhel more than the whole expence of raiſing them, and the land left in an improved ſtate; and two guineas per load for the hay, which was very indifferent; and both, at this high price, conſumed on the farm. If only the difference between £.67 : 17*s* : 7*d*. and £.71 : 16*s* : 5*d*. is conſidered, undoubtedly the profit will appear ſmall; but when it is proved, that each Ox increaſed in value one ſhilling per day, by Potatoes, ſurely it proves a great deal.

I fear the Committee think the account I have already ſent, too prolix; and what I ſhall add hereto, will certainly render it much more ſo; for which reaſon perhaps it ſhould be abridged.

After the particulars of the profit on the fourteen Bullocks, ſtated as amounting to £.71 : 16*s* : 5*d.* I conceive ſhould be added £.12 : 10*s*. for two hundred and fifty loads of dung, which, at the leaſt, were obtained by them, and will make the ſum gained, to pay for their keep, £.84 : 6*s* : 5*d*.

The Hay given, was in equal portions, at noon and night: they were twice in the day looſed to drink, which in general was but little. Strict orders were given to the ſervant that attended them, not to leave any Potatoes in the troughs, when he left them at night; for, twice or thrice, an Ox was nearly choaked by a Potatoe: therefore I had always a large ſtiff rope ready (ſoft at one end) to force down the throat, in caſe of ſuch an accident; and certainly it was very neceſſary.

It may be obſerved, that I have not broaght forward any charge for attendance; but I conſider the improvement of fifteen Pigs, that were ſupported by the refuſe in the troughs of the Oxen, to have been equal to the expence of a man attending them. I am,

SIR,

Your obliged humble ſervant,

WILLIAM DANN.

Gillingham,
November 27, 1792.

Mr. MORE.

SIR,

THE account I ſent you in October laſt, on feeding Cattle and Sheep with Potatoes, to be laid before the Society for the Encouragement of Arts, Manufactures, and Commerce, having been favourably received, I think it my duty to inform them, that I have, in a ſmall degree, lately carried the idea there mentioned, into effect, viz. of a reſerve of Potatoes for Ewes and Lambs, in the ſpring, that Turneps may not remain to exhauſt the land, to the injury of ſucceeding crops, &c.

The difficulty I before experienced in the Sheep taking to eat the Potatoes, made me fearful of accompliſhing it; but, by placing troughs in the field ſome days before the Turneps were finiſhed, and frequently cutting into them a few Potatoes, the moſt part of the Ewes, and ſome of the Lambs, were brought to eat them, even when they had plenty of Turneps.

From the 2d to the 14th inſt. incluſive, one hundred and fifty-ſix Ewes, and one hundred and fifty-five Lambs (from three to eleven weeks old) were kept in a meadow of five acres and three quarters, on Potatoes and Clover Hay. I weighed what was given them for two days, and found they eat each day, of Potatoes, ſix hundred and ſixteen pounds, and, of Hay, two hundred and ſeventy-nine pounds. Although the period was ſhort, it was highly valuable; for, if I had been compelled to have put them on my Clover, when the Turneps were finiſhed (April 2), there was very little for them; and beſides, it would have occaſioned the produce to be leſs afterwards, by being fed when ſo very young.

But I beg leave to obſerve, that I have an idea of extending the uſe of Potatoes for Sheep much farther*, viz. till Lucerne and Clover may be mown for them, in lieu of paſturing the Clover; conceiving that the produce will be conſiderably more, if mown, than fed; for it appears to me, that Clover, wounded repeatedly by the bite, muſt produce much leſs than when cut once with the ſcythe.

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* The high price of Potatoes this ſpring, induced me to diſpoſe of ſeveral hundred buſhels, which otherwiſe would have been applied in ſupport of this idea.

In the laſt ſummer, I kept my Ewes and Lambs near a month on Clover mown, and given to them in a paſture-field near; on which they did well; and this will ſerve as a proof to me, of the practicability of the idea, as far as concerns the keeping Sheep on freſh-mown Clover.

I alſo beg leave to add, as an additional proof of the utility ariſing from the cultivation of Potatoes, that I have this winter fed many Oxen with them, and that they did well.

As one of the many who ſuffer conſiderably by the effect of the grub, I beg the Society to accept my moſt grateful thanks, as well for their views in general, as for their offer of a Premium for the means of deſtroying that injurious inſect; although I fear it will remain for the ſeaſons to correct. The only partial relief that has occurred to me is,—Perſons following and picking them up as the ground is ploughed.

With the moſt profound deference and reſpect for the Society, I remain,

SIR,

Your moſt humble ſervant,

WILLIAM DANN.

Gillingham,
April 18, 1792.

Mr. MORE.

Thanks were given to JOHN HUNTER, Eſq. of Gubbins, in Hertfordſhire, for the following Communication relative to the feeding Cattle with Potatoes, and the advantages that will ariſe from that practice becoming general.

SIR,

I OBSERVED in one of the daily papers ſome days ago, that the Society for Encouragement of Arts, Manufactures, and Commerce, of which I have the honour to be a member, had given a reward to Mr. Bucknell, of Knowſton, in Devon, for cultivating Potatoes for feeding Cattle and Sheep. I beg to inform the Society, without the leaſt intention to derogate from the merits of Mr. Bucknell, that this operation in Huſbandry is not altogether new: I have practiſed it for two years. The laſt year I fattened one hundred and three Oxen, principally with that food; and, at this ſeaſon, and at this hour, I have no leſs than ſeventy capital Cattle feeding on that proviſion, which I find wonderfully nutritive; but will not fatten an Ox in any reaſonable time, without the aſſiſtance of Hay. Potatoes are certainly a great help to a Cattle-fattener, and well worthy a general practice over all the kingdom; becauſe, after any crop of the former year, plough your land in boughts, to be bit by the froſt in winter, and make it ready to receive the crop in April: ſow then the eyes of the Potatoes in lines, following the plough, and leave a ſpace between each furrow, of about four feet, in order that the plough may paſs in this ſpace to kill weeds in ſummer, and turn the mould up to the root of the haulm on either ſide, going up and down. From proceeding thus in any dripping year, you will not fail of two hundred buſhels to an acre, which, at one ſhilling per buſhel, is a great return. But the greateſt advantage of all, is, that the crop has ſo cleaned and meliorated the land, equal to any ſummer fallow, that it becomes perfectly fit, in good time, ſay the month of October, to ſow Wheat. Thus have I done this year, in a field of thirty-eight acres, where Potatoes grew, that were ploughed out, and gathered by women, at a penny a buſhel; and the land brought into ſuch excellent order, that I made uſe of the drill-plough to ſow Wheat, and quickly finiſhed the buſineſs with a buſhel and a half of ſeed as uſual. The haulm of the Potatoes, as litter, was nearly worth as much as the expence of gathering them. I am,

SIR,
Your moſt obedient ſervant,
JOHN HUNTER.

Gubbins, Herts,
Dec. 1, 1791.

Mr. MORE.

The GOLD MEDAL, being the Premium offered for the cultivating Rhubarb, in the year 1791, was adjudged to Sir WILLIAM FORDYCE, M.D. F.R.S. from whom the following Letter and Certificates were received.

SIR,

HAVING obſerved in the Liſt of Premiums offered by the Society for the Encouragement of Arts, Manufactures, and Commerce, that a Gold Medal is offered for raiſing in the year 1791, not leſs than three hundred plants of the true Rhubarb, the Rheum Palmatum of the London Pharmacopœia, 1788 (*L. Spec. Plantar.*); I take the liberty to ſend herewith the Certificate of the Miniſter of the pariſh, where my Gardener raiſed from the ſeed, this laſt ſpring, many more than three hundred plants; and the Gardener's Certificate, that he tranſplanted, in the ſecond and third weeks of October laſt, more than three hundred plants, into a piece of ground of mine, in a deep loam, at four feet diſtance from each other, complying in every reſpect with the rules and orders laid down in the laſt Volume of the Tranſactions of your moſt uſeful and public-ſpirited Society. I am,

SIR,

Your humble ſervant,

W. FORDYCE.

January 24, 1792.

Mr. MORE.

THESE are to certify whom it may concern, that I, in company with Sir William Fordyce's Gardener, have this day ſeen and counted upwards of three hundred Rhubarb plants, all in good health, and growing in a garden belonging to Sir William Fordyce, in the pariſh of Paddington, Middleſex. Witneſs my hand, this 14th of October, 1791.

J. SHEPHERD,
Miniſter of Paddington.

THESE are to certify whom it may concern, that I ſowed, in the middle of March, April, May, and June, of this preſent year, ſeeds of Rhubarb (Rheum Palmatum Pharmacopœiæ Londinenſis, 1788), on the north-eaſt, eaſt, and ſouth-eaſt aſpect borders of his gardens in Edgware Road, by Paddington, in Middleſex; of which plant, in a healthy ſtate, I tranſplanted three hundred and twenty into a a piece of ground occupied by my maſter in Brompton, of two and three feet depth of fine loam, in the ſecond and third weeks of October, at the diſtance of four feet, as propoſed and ordered by the Society for the Encouragement of Arts, Manufactures, and Commerce. By me,

WALTER SCOTT,
Gardener to Sir William Fordyce.

London,
October 22, 1791.

The GOLD MEDAL, being the Premium offered for gaining Land from the Sea, was this year adjudged to Mr. G. POYNTER, of Canewden, near Rochford, Eſſex, from whom the following Papers and Certificates were received.

To the Society for the Encouragement of Arts, Manufactures, and Commerce.

MY LORDS AND GENTLEMEN,

HAVING within theſe few years hired a Marſh Farm in Wallis's Iſland, called Tyle Barn, lying open to the German Ocean, or that part of the Sea called the Swin, to the eaſtward; bordering upon the River Crouch, or Burnham River, to the north; upon the river running between the ſaid Iſland and Foulneſs, to the ſouth; I had, at various times, an intention of encloſing part of the Saltings attached to the ſaid Farm, which were then overflowed by the Sea; and, indeed, contrary to the advice of my friends, and ſuch perſons whom I conſulted upon the occaſion, reſolved to make the attempt; and accordingly advertiſed for Wallers, and engaged with two companies from the Iſle of Ely and Northamptonſhire, beſides one company I had in the neighbourhood, amounting in the whole to ſeventeen perſons. On the 22d of March, 1790, began to embank the ſaid Saltings, by making a delf-ditch, twelve feet wide: the ſeat of the wall is twenty-one feet wide, ſix feet high, and five feet wide on the top. On the 13th of May following, the tide was obſerved to be turned from the ſaid wall. The length of the new wall is two hundred and eighty-ſix rods, allowing twenty feet to the rod. On the 17th of July, 1790, the new wall was entirely completed; and, to my great ſatisfaction, I found myſelf in poſſeſſion of ſeventy acres and upwards of Land, equal in quality to any in the Iſland, and likely to turn out very valuable.

As an additional advantage ariſing from this new embankment, there is no doubt, had it not been done, but the whole Iſland of Wallis, containing between two and three thouſand acres of land (all of which is at this time in high cultivation) muſt have been inundated by the extraordinary high tide in February laſt; but, owing to the new wall being upwards of two feet higher than the old one, two hundred and twenty-one feet of which was entirely defended by the new, and which is now the outer wall, the water was prevented injuring the landholders in the iſland, although the tide was, during two hours, nearly over the new wall; and the conſequence muſt otherwiſe have been very ſerious indeed, as it was computed that two thouſand ſheep, excluſive of a variety of other ſtock, muſt otherwiſe have periſhed.

Annexed you have a particular account of the Expences; and I am,

My Lords and Gentlemen,

Your moſt humble ſervant,

G. Poynter.

Canewden,
May 13, 1791.

THIS is to certify, That the foregoing ſtatement is true.

Herbert Randolph,
Vicar of Canewden,

Robert Tabrum,
Churchwarden.

Account of the Expences attending the Embankment.

	£.	s.	d.
Length of wall, 286 rods, at 20*s*. — —	286	0	0
Barrows — —	10	0	0
Planks and gang-ladders	14	9	0
Carried forward	310	9	0

	£.	s.	d.
Brought forward	310	9	0
Gutter — —	10	0	0
To the overlooker of the three companies —	13	13	0
Extra expences —	10	0	0
Total Expence	£.344	2	0

G. POYNTER.

SIR,

IN addition to what has already been tranſmitted to the Society, relative to the Saltings lately embanked and taken in from the Sea, by me, I beg leave further to add that, about four months after the wall was completely finiſhed, being as ſoon as it would admit the weight of horſes upon it, I thought it adviſeable, in order to ſtrengthen its ſolidity, to have it conſtantly rolled with the heavieſt ſtone roller I could procure; which I put in force, and continued practiſing, for the ſpace of eight or nine months, with a roller weighing between five and ſix and twenty hundred weight, and which was drawn by four horſes. I was aſtoniſhed, and ſo were my neighbours, at the efficacy of this plan; for, owing to the wall conſiſting of nothing more than the oozy earth thrown up from the outer ſide, it would have been ſome time before it would have thoroughly adhered to the bottom: and by this means I am confident the wall was made much more durable, and in a ſhorter time defended from the ſea; and I could at all times obſerve, when rolling it, that the preſſure affected the earth more than five feet from the ſurface of the wall. At the time of doing this, I ſowed twitch-graſs and rye-graſs on the inward part of the wall, which throve beyond my expectation, particularly the rye-graſs, of which I have, at this time, a good plant; and the roots, by entwining into the bank, add ſtrength thereto, and the graſs itſelf ſerves as a paſturage for my Cattle. I am,

SIR,

Your very obedient ſervant,

G. POYNTER.

Canewden,
January 5, 1792.

Mr. MORE.

THIS is to certify, That the foregoing ſtatement is true.

HERBERT RANDOLPH,
Vicar of Canewden.

ROBERT TABRUM,
Churchwarden.

The GOLD MEDAL, being the Premium offered for draining the largeſt Quantity of Land, was this year adjudged to JOHN KEYSAL, Eſq. of Morton-upon-Lugg, near Hereford; but the Society, in conſideration of the valuable information ſent by two other Candidates, GEORGE PEARSON, Eſq. of Harperley, in Durham, and Mr. JOHN WEDGE, of Bickenhill, near Coventry, Warwickſhire, voted to each of thoſe gentlemen, a SILVER MEDAL, as tokens of approbation of their ſpirited exertions in that neceſſary and uſeful branch of Agriculture.

An Abſtract of theſe Papers is here inſerted; and the Originals, with Plans of the ſeveral Eſtates mentioned in the accounts, are reſerved in the Society's Repoſitory, for the inſpection of the Public.

SIR,

I TAKE the liberty of ſending you the particulars of improvement on my eſtate in Herefordſhire, which I beg you will lay before the Society for the Encouragement of Arts, Manufactures, and Commerce.

The whole quantity of Under-draining done, is thirty-one thouſand yards: the ſhalloweſt of the drains are a yard deep; many of them much deeper: the materials ſtone. The expence of doing it, two-pence per yard forward; one penny for workmanſhip; raiſing the materials, and hauling to the place, one penny more. Thirty-one thouſand yards, at two-pence per yard, comes to two hundred and fifty-eight pounds ſix ſhillings; for which two hundred and ſeventy-two acres and two roods of Land are effectually drained. Its annual value is, by this means, increaſed from one hundred and ſixty-three pounds, ſeventeen ſhillings and ſix-pence, to two hundred and thirty-eight pounds, twelve ſhillings. Twenty-three thouſand three hundred yards of the under-draining was done in the year 1791; the remaining ſeven thouſand ſeven hundred yards was done in the years 1790 and 1792.

Open-draining, &c. at Moreton.

There is a new water-courſe cut through the eſtate, to take the brook down the loweſt part of the land: the winding, irregular courſe of the old brook, was two thouſand ſeven hundred and ſeventy-two yards; the new courſe is two thouſand two hundred yards only. Part of the new brook is about eight feet wide, and four feet deep: it afterwards deepens gradually to about ſix feet: the new line being much ſhorter, as well as more regular, its relative fall is greater, and conſequently its rapidity is much increaſed.

The ſoil is principally clay or marl, and lies rather flat; but in ſome parts it is a gravelly ſoil, and has a good deſcent. The ſurface of the water in the old brook, was generally higher than the land, at a few yards diſtance from its ſides; whereas the ſurface of the water in the new courſe, is generally a yard below the adjoining land, which it drains for a very conſiderable diſtance on each ſide, particularly in the gravelly part. About ſixty acres of land is become nearly double its original value, by this improvement.

Beſides the new brook, there are many large open water-courſes all over this eſtate, which, though not entirely new, are principally ſo, particularly one branching out of the new brook, and extending two thouſand two hundred yards, and bounding the eſtate on the north ſide: this courſe is in general about five feet wide, and five feet deep: this was only a common ditch, as was likewiſe a collateral branch extending from this cut five hundred yards.

There is likewiſe another branch ſets out of the new brook, and extends five hundred yards, and, for ſome diſtance, bounds the weſt ſide of the eſtates: this is wholly new. Alſo, the old boundary fence, extending from the Wiſter brook up the ſouth ſide of the eſtate, has had its ditch made very wide, deep, and regular; and it now gives a ready diſcharge to a vaſt quantity of water.

There are a great number of other open drains, and deep ditches, made to convey the water from the under-drains to the main brook; and theſe open drains have effected a very great improvement upon the whole eſtate. The expence of the open courſes amounts to one hundred and ninety pounds.

The road through this eſtate was exceeding bad and inconvenient: it is now made very good and commodious, to the great benefit of the eſtate and neighbourhood, and which coſt the proprietor one hundred and ninety-ſix pounds. There are likewiſe two new bridges built over the cuts, which coſt forty-one pounds eighteen ſhillings.

Summary of the Expence of the Improvement done at Moreton, 1790.

	£.	s.	d.
Cutting the new brook, different water-courſes, and open drains — —	190	0	0
Under or hollow drains, made with ſtone, 7700 yards, at 2*d*. per yard — —	64	3	4
New road through the eſtate	196	0	0
New bridges — —	41	18	0
	492	1	4

Expences in the year 1791.

	£.	s.	d.
1200 Yards of open draining, part at 3*d.* and part at 1½*d.* per yard —	12	7	0
23,300 Yards under-draining, made with ſtone, at 2*d.* per yard — —	194	3	4
	206	10	4

	£.	s.	d.
Expences in 1790	492	1	4
Expences in 1791	206	10	4
Total Expence	698	11	8

which has improved two hundred and twenty acres, two roods, and thirty-two poles of land, and increaſed its yearly value fifty-ſix pounds, eight ſhillings, and ſixpence. I am,

SIR,
Your very humble ſervant,
JOHN KEYSALL.

Temple-Bar,
February 14, 1792.

Mr. MORE.

SIR,

I NOW ſend you, agreeably to the requeſt of the Committee of Agriculture, a more particular account of the improvements lately made upon my eſtate at Moreton, near Hereford; for which the Society have done me the honour to adjudge me the Gold Medal.

In November, 1789, I bought the eſtate; and, ſoon after that period, I went over it with my ſteward, Mr. Wainewright, who is a land-ſurveyor, at Hereford, and found that the land, though good in its nature, was rendered of ſmall value, from its being often overflowed; and, inſtead of producing good graſs for feeding and mowing, was almoſt covered with ſedges and ruſhes.

We then conſidered what method ought to be adopted for the improvement of it; and it appeared to us, that nothing could remedy the evil, but draining. The firſt ſtep was to take a level, in order to find out the loweſt part; and as no perſon in that country had been uſed to a buſineſs of this kind, I ſent for a man out of Staffordſhire, who had been employed there by the proprietors of canals.

The firſt thing he adviſed, was, to cut a large open drain through the whole of the land; which was ordered to be done, being about one mile and a half long; the lower part of which is nine feet wide, and ſeven feet deep; and the upper part, five feet wide, and about four feet deep; which occaſioned a fall for the water to run off, and prevented its being pounded up.*

By this means we were alſo enabled to procure a fall for the under-drains to empty themſelves into: beſides this, we cut ſeveral other large open drains, not only acroſs the land, but alſo one on each ſide the boundary

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* My drain runs into other drains, which, at a conſiderable diſtance, diſcharge themſelves into the the river.

boundary of the eſtate, which has had the effect, not only of improving my own land, but alſo a conſiderable quantity of other people's adjoining thereto; and, I flatter myſelf, the truth of what I aſſert is ſo viſible, that it will induce others to adopt the like method of improvement. Some gentlemen have, indeed, already begun ſo to do.

Another great uſe of the large open drain, is, that the river Lugg, which bounds the one end of my eſtate, often overflows; and from the meadows being lower than its banks, and the old courſes nearly filled up, the water could not return, but remained on the land; but by this new cut it is now taken off.

This, though a very expenſive work, did but in part effect the remedy; and although the land was much improved near the drains, that at a diſtance did not reap an equal benefit: it was then we were determined to have under-drains cut where they were found neceſſary: we ſurveyed the land; and wherever the water forced its paſſage to the ſurface of the earth, and thereby prevented the growth of graſs or corn, we cut under-drains, to the quantity laid before the Society; and by that means have now made the whole perfectly dry and ſound, and of nearly double the value it was before.

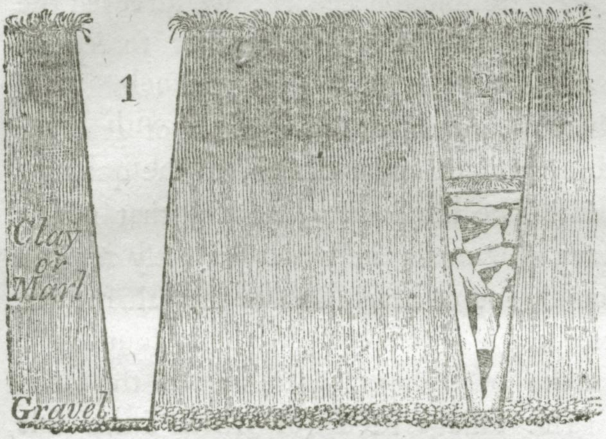
The village itſelf (of which I am ſole proprietor) uſed to be called *Dirty Moreton.* I have now got rid of that appellation, by making through it, at my own expence, as good a road as any in the county of Hereford; and have rendered it not only pleaſing to the eye, but ſafe and commodious to the traveller: it now affords one of the moſt agreeable rides in the vicinity of Hereford. I am,

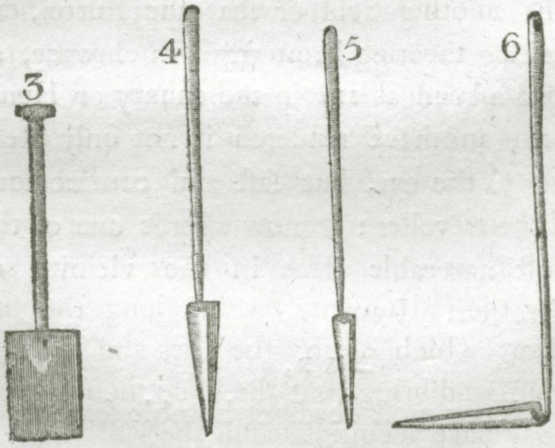
SIR,

Your moſt obedient humble ſervant,

JOHN KEYSAL.

Temple-Bar,
May 1, 1792.





Explanation

Explanation of the Cut.

Fig. 1.—Repreſents the trench, when made, prior to its being filled with ſtone. This trench is generally three feet ſix inches deep, one foot wide at the top, and about four inches wide at the bottom. It is made at three operations, in the following manner: the turf is firſt taken off, about four inches thick, and laid by, to be put on the top of of the ſtone: the ſoil is then taken out, about a foot deep, with a ſpade: they next dig another foot, with the inſtrument, *fig.* 4, tapering from the top downwards, and curving a little; and, finally, it is ſunk to its proper depth, with the inſtrument, *fig.* 5, ſimilar to the laſt, but ſmaller in its dimenſions. After it is ſunk to a proper depth, it is cleared and ſmoothed, by drawing the inſtrument, *fig.* 6, along the bottom, which cleans the ſides and the bottom, and brings out the looſe mould which may have accumulated in the working.

Fig. 2 — Repreſents the drain when filled, which is done by placing two of the wideſt and flatteſt of the ſtones, edgeways, on the bottom of the drain, and rearing them againſt the ſides, and afterwards throwing the reſt of the ſtones in promiſcuouſly, generally obſerving to put the largeſt uppermoſt. Upon the ſtones is placed the turf, which was taken from the ſurface: this is inverted, and the graſs ſide put downwards upon the top of the ſtone, to prevent the mould from falling into, and filling up the vacuities. In arable land, ſtraw or ſtubble is made uſe of as a ſubſtitute for the turf. The ſtones in the drains uſually take up about two feet of the depth, and the earth on the top, about eighteen inches.

In boggy parts, where the bottom is unſound, it is neceſſary to place a ſmall alder pole along the bottom of the drain, to prevent the ſtone ſinking into the ſoil. In wet ſpringy land the water runs through different ſtrata of ſoil, and at different depths in the earth; ſo that a drain, filled two feet high with ſtone, is much more certain to drain land, than a hollow drain made with brick, which is ſeldom more than ten or twelve inches, and is made at a much greater expence.

With theſe Papers came a Certificate, ſigned by the Rev. FRANCIS WOODCOCK, Rector of Moreton, and WILLIAM WAINEWRIGHT, Surveyor of the premiſes; by which it appears, that, before the improvements took place, the lands were in a very wet ſtate, and that they are greatly amended by the draining.

The following Letter contains an Abſtract of the Account of the Improvements made on the Lands at Harperly, in Durham, by Draining, for which the SILVER MEDAL was voted to GEORGE PEARSON, Eſq.

HARPERLY Eſtate is ſituated about fourteen miles to the weſtward of Durham, and five miles from Biſhop Auckland: the greateſt part of the ſoil whereof, is of a loamy quality, with a clay bottom; but the other part, contiguous to the river Wear, is a deep rich ſoil, mixed with gravel.

About five hundred acres of this eſtate form a hill-ſide, or declivity, which generally falls to the ſouth-weſtward, at the rate of one foot in twenty. The ſtrata near the top of the hill, where a coal-mine has been opened and worked, are as follows, viz.

mooriſh earth, mixed with looſe ſtones, ſlate, &c. for about four fathoms; looſe earth and running or quick ſand, two fathoms; free-ſtone, five fathoms; black ſhale and ſtone, two fathoms; and coal, two fathoms.

This ground declining, or dipping ſouthweſtward, the whole of the water which ran in the bowels of the different ſtrata above mentioned, at different degrees of the declivity, diſcharged itſelf on the ſurface of various parts of the ground, by which one hundred acres of it were rendered entirely a bog, and whereof about two-thirds would hardly bear an animal, and were of no value; and the other third, of the value of three ſhillings per acre.

The produce, before draining, was wild marſhy graſs, ruſhes, ſparts, bent, brambles, and bruſhwood. In ſituations like this, there is much more difficulty and expence in draining the ground, than where it lies more upon a level, becauſe the internal ſprings ariſe to the ſurface in ſo many different places, and muſt be taken off and conveyed away in ſo many ſeparate cuts or ſewers.

In the year 1791, the one hundred acres of land above mentioned were drained by hollow drains of free-ſtone: the drains were cut two feet wide, and from three to five feet deep; and where they were made in a running or quick ſand, the ſole, or bottom, was laid with flag or flat ſtones, to prevent the paſſage from being filled or choaked up by the ſand. Theſe drains contain in the whole, by an actual admeaſurement, ſeven thouſand ſeven hundred and thirty-five yards; and the expence of making them amounted to ſixpence-halfpenny per yard, upon the average.

It is ſuppoſed that the drains diſcharge, in dry weather, as much water from each acre, upon an average, as is capable of being paſſed through a tube of two inches diameter; and, in wet weather, when the water has ſunk from the ſurface into the bowels of the different ſtrata, a great deal more. By means of draining the above-mentioned one hundred acres of land, in the manner before deſcribed, the ſame are rendered fit for cultivation, and ſuppoſed to be of the yearly value of fourteen ſhillings an acre, upon the average; and are capable, by proper manuring and huſbandry, of further improvement.

Durham,
Jan. 20, 1792.

The above account is ſigned GEORGE PEARSON, and certified by the Rev. JOHN FARRER, Curate of Witton Le Wear, in the county of Durham; ARTHUR MOWBRAY, Agent to George Pearſon, Eſq. and ſeveral Inhabitants of the neighbourhood.

The following is an Abſtract of the Papers ſent by Mr. JOHN WEDGE, and deſcribing his manner of draining Land, at Bickenhill, near Coventry; for which the SILVER MEDAL was voted to him.

SIR,

I HAVE the honour to be employed by the Earl of Aylesford, in taking care of ſeveral eſtates; and have, in this and former years, encouraged by his liberality, drained large portions thereof: part of which is in his Lordſhip's occupation, and part of it, as tenant to him, in my own.

From a conſideration, that the manner in which this has been done, may not be unworthy of the notice of the Society for the Encouragement of Arts, Manufactures, and Commerce, I beg the favour of you to lay the account thereof before them. Should any of the facts be worth communicating to the public, I beg that the Society will ſend them out in ſuch manner, or in ſuch words, as may beſt ſuit the purpoſe; and ſhould the leaſt information be conveyed, or benefit derived, to the public, from this feeble communication, my gratification will be complete.

I have little time to read; but in the few treatiſes on huſbandry which I have ſeen, draining Land, though mentioned as one of its moſt eſſential improvements, ſeems not to be well explained. It is not my intention to obtrude much theoretic ſpeculation on the object of Draining: the learned Society to whom the following practical facts are humbly ſubmitted, do not, I am certain, want any information in matters of theory; yet thoſe practical facts will, I hope, juſtify my preſumption in making ſome ſhort obſervations, to point out what have been leading principles to me, in my late undertakings of this ſort. In every country there are large portions of land that, in wet ſeaſons, have always what may be called a dry ſurface, and other portions of land that have always a moiſt or wet ſurface: the former of thoſe admitting all the water which falls upon them, to ſink freely through their pores, to various depths, till falling on clay or ſome other unctuous earth, whoſe pores will not permit it to paſs through, it is there held up, to a height proportioned to the quantity of water which comes upon it, and the facility with which that water is diſcharged: thus held up to various heights, it ſerves as a fountain to diſtribute its water (either by veins of ſand, pebbles, or rocks), according to the formation of the different under-ſtrata on the neighbouring lands, and there forms bogs and other varieties of wet ſurface, on a baſis that will, I believe, be always found to conſiſt of marl, clay, or ſome mixture thereof. The effect of water thus diſtributed, may be divided into two claſſes.—The firſt claſs, where the water is thrown out by a body of marl or clay, &c. upon the ſurface of deſcending ground, and in the valley (there held up by clay alſo), forms bogs or ſwamps: the ſecond claſs, where the water is held up by clay or marl, as before, having, above that marl or clay, a ſtratum of ſand or pebbles, through which the water paſſes; and, above thoſe ſands, or pebbles, another ſtratum of marl or clay, through the weakeſt parts of which, the water, by a continual preſſure from its fountain, forces a paſſage upwards; and thus, through the weakeſt parts of the marl or clay, furniſhes a continual ſupply of water, on the ſurface, for the formation or growth of bogs, &c. in proportion as this water is more or leſs abundantly ſupplied by its fountain or head, namely, the higher lands, into which rain-water freely paſſes, as before deſcribed. There are alſo different ſoils, under different circumſtances, which may form a third claſs of land for draining; ſuch as ſtrong deep ſoils, or open light ſoils, having near the ſurface a body of marl or clay: in either of theſe caſes, the water which falls on the ſurface muſt, for reaſons which are ſelf-evident, keep ſuch lands, in rainy ſeaſons, conſtantly wet and cold; and it ſhould be obſerved, that a mixture of all the three before-deſcribed claſſes of wet land, ſometimes occur in one field, by ſudden alterations of the under-ſtrata, and thereby perplex the operator, by requiring all the different modes of draining in the ſame field.

If it be admitted that bogs are thus formed and fed, their cure may be effected with certainty.—The firſt claſs, by cutting through the ſtratum (be it ſand, pebbles, or rock) that conveys the water to the bog, and carrying off that water by a cloſe drain, to ſome proper place, where the level admits of its diſcharge: the ſecond claſs, by ſinking a drain to any convenient depth in the upper clay; then, at a ſmall diſtance, on one ſide of this drain, dig, or, with a large auger, bore through the remaining part, be it (the upper clay) ever ſo deep, into the under-ſtratum of ſand, pebbles, or rock. through which the water paſſes ; and it will then ruſh up into the drain ſo made, with a velocity proportioned to the height of the land, or fountain, from whence it is ſupplied. As this drain advances through the land, holes muſt be dug or bored, as before, every ſeven yards, or at ſuch diſtance as the ſtrength of the ſprings may require; and the whole of the water thus brought up by tapping the ſprings, is carried off by the drain, made in the upper clay, which muſt be a cloſe one, to its proper level, and there diſcharged.

By both theſe methods of draining, large tracts of land, under favourable circumſtances, may be cured with one drain. The beſt place for fixing theſe drains, is where the ſtratum that conveys the water comes neareſt to the ſurface; and the beſt method of aſcertaining that, is to bore, or dig, in different parts, through the different underſtrata.

The third claſs may be eaſily cured by cloſe drains, at ſuch diſtances and depths as will beſt carry off the ſurface water. It may not be improper to obſerve, that where the different ſtrata or meaſures *crop out*, that is, become gradually more and more ſhallow in ſome certain direction, as is often the caſe, till, one after the other, they all preſent themſelves in ſucceſſion, on the ſurface of the earth; in ſuch caſes draining may often be much more eaſily and better effected by croſſing, with the drain, the different ſtrata or meaſures, where the levels and other circumſtances will admit.

Some of the land drained, was part of a common, in the pariſh of Church Bickenhill, in the county of Warwick: a part of it was covered with moſs and ling, has a peaty ſurface, about ſix inches deep, and produced little or no graſs. In all wet ſeaſons, it was filled quite to the ſurface, and often overflowing with water. Some of the land was much more unſound, deeper of peat, and covered with moſs in moſt parts, nine inches long; another part was an abſolute bog in all ſeaſons.

Having dug or bored, with a large auger, into ſeveral parts of the land, I found peat, gravel, and ſand, mixed, and a quick ſand almoſt uniformly. The quick ſand, in every part, after getting an inch or two into it, ſeemed almoſt as fluid as water: judging from thence that no materials for a drain could be laid in the quick ſand, but what it would immediately bury, I dug a trench almoſt to the quick ſand, leaving gravel, &c. of ſufficient ſtrength to bear up the materials for a hollow drain: theſe materials were two ſides and a coverer of ſtone, with a peat turf on the top, to keep out the ſoil. At every ſeven yards forward, by the ſide of this drain, I dug a hole into the quick ſand, as deep as it would permit: from theſe holes the water roſe freely into the hollow drain, and was by it diſcharged at a proper level. It may be proper to remark, that the ſtone made uſe of for this drain, and all others here mentioned, is a red ſand and rag ſtone, from Meriden Quarry, about four miles from this place, which eaſily ſplits into proper ſizes for the purpoſe, and is very durable: it coſts about ſixpence per ton getting, excluſive of carriage. The drain thus formed, ran on the whole rather freely, and made the land dry for a few yards on each ſide thereof, but was far from having the effect I improperly expected; for it evidently appears, the drain could only take a very ſmall portion of the water from ſo large a quick ſand, which it did not penetrate more than two inches; and that it could drain only to its own depth, or, at moſt, to that depth in the fountain which ſupplied the quick ſand. My purpoſe was then defeated; and my motive for mentioning this error, cannot, I hope, be miſtaken.

I now did what I ought to have done before, that is, examined the different ſtrata to a greater depth, particularly on the bog, and at the upper edges thereof, and found the bog to be what has been deſcribed under the firſt claſs. I therefore determined to attempt the cure in the manner before preſcribed for that claſs, namely, to cut through the whole of the ſtratum, in this inſtance of quick ſand, through which I found the water paſs: this I effected as follows.—The ſummer being dry, and favourable for the purpoſe, and having previouſly made my main open drain, I began my main cloſe drain, the firſt week in June, 1791, three feet wide on the declivity near the edge of the great bog: in the firſt operation, we dug through the peat, the hard ſand, and gravel, and one ſpade's graft (about nine inches deep, and ſeven inches wide) into the quick ſand, the whole length of this drain, which is ſeventy-three perches of eight yards to the perch in length. The drain thus dug, ran copiouſly, not leſs than ſixty gallons per minute: in this ſtate I left it about nine days; the effect of it was rapid, both above the drain, and on the bog below. Upon examination, I now found about three inches on the top of the ſpade's graft, which had been made into the quick ſand perfectly dry: we then dug out this three inches of dry ſand, to nearly the whole width of the drain,, three feet; and at the ſame time dug out, as before, another ſpade's graft from the top of the quick ſand, as near the middle of the drain as poſſible: this was left to run a few days as before, and had the ſame effect, namely, three or four inches more of the top of the quick ſand became dry and hard: the ſame operation was repeated again and again, with the ſame effect, till the purpoſe of getting through this quick ſand was completed, ſo far at leaſt as the level of the main open drain would permit. The ſtream of water continued increaſing during the whole operation: the bog below the drain was quite dry, and the land above perfectly ſo: the drain which was firſt made, and continued running for ſome time, during the progreſs of the main cloſe drain, became gradually dry; and has not, ſince that drain was finiſhed, diſcharged one ſingle drop of water. Great care was neceſſary in making the main cloſe drain to keep the ſtream of water in the *middle* of it, otherwiſe the current would have undermined the ſides, as it ſometimes had done, and cauſed them to fall in: for this reaſon, it was neceſſary, when the dry ſand was taken from the top of the quick ſand, *immediately* to take out a ſpade's graft from the *middle* thereof, in order to divert the current from the ſides.

The main cloſe drain thus made, was three feet wide at top, about nine feet deep on the average; and bevelling a little from the top, it was about one foot ten inches wide at bottom. The ſtone and other materials were put into this drain in the following manner.

Where the drain went through the quick ſand into the ſtratum of clay below it, as in moſt places it did, the bottom, and in ſome inſtances the ſides, wanted no particular ſecurity; but where it did not go quite through the quick ſand, which the level of my main open drain in ſome places would not admit, the bottom of the drain was covered half an inch thick with ling; then peat-turfs, one foot wide, and three or four inches thick, were cut in convenient lengths, and placed on their edges, on each ſide the bottom of the drain, forming two ſides of a trough of peat: then ſide ſtones, about eight inches high, and a ſtone coverer, were put in upon the ling, between the peat turfs: a large peat turf, near two feet wide and four inches thick, was then cut, and firmly placed over the whole: this left, in the bottom of the drain, an open ſpace of more than ſix inches ſquare, for the water to paſs. The whole was then completed by filling-in the upper part of the drain.

Fifteen acres are now ploughed for a fallow: the bog (nine acres) will now bear a horſe; but as it was, before draining, quite a pulp, I ſhall let it harden during the next ſummer, before it is ploughed.

Another part of the bog is laid dry in the ſame manner as that before deſcribed, by drains; with this difference, that the quick ſand lay nearer the ſurface of the land, and was much thinner; therefore the drain went through it ſo far into the clay, as to render ſide-turfs in moſt places unneceſſary, its depth on the average not being more than five feet: the laſt-deſcribed land, about eight acres, I intend to plough in March for oats. I have this day, the

20th of January, 1792, meaſured the quantity of water diſcharged through theſe drains, by ſinking a hole near the ſide of the main open drain, and placing a caſk of known dimenſions therein, and find the diſcharge to be $50\frac{4}{10}$ gallons in one minute, or 72,576 gallons in twenty-four hours. The land, thus drained, will, with proper cultivation, be worth at leaſt fourteen ſhillings per acre. The draining of theſe thirty acres of land coſt me about eighty pounds, excluſive of the ſuperfluous drain. The whole length of theſe cloſe drains, is ſixteen hundred and fifty-five yards.

I have alſo hollow-drained nine acres of my farm, in the bottoms of three pieces of encloſed land, called Small Leafield, Old Land, and Holywell, by the method preſcribed for the third claſs of wet land. Theſe drains were made a few yards below that part of each field where the dry and wet land ſeparate, about twenty-two inches deep, with ſides, and a coverer of ſtone, and ling on the top of it, to keep the earth from running in. The length of theſe drains is eight hundred and eighty yards, and the expence of labour and materials, three halfpence per yard: the drains, in wet weather, diſcharge a large quantity of water, and will, I have no doubt, anſwer the intended purpoſe.—Thus far relates to land in my own occupation.

Nine acres of the land, in the Earl of Aylesford's own occupation, was almoſt an entire pulp. This bog was of the ſecond claſs, namely, water paſſing through a quick ſand, and confined by a ſtratum of clay below, and another ſtratum of clay above it. The water, thus confined, by being preſſed by its fountain, and forced up through the weakeſt parts of the clay, had formed a bog of irregular thickneſs, on the ſurface, in ſome places, ſix feet deep, and in others not more than two. As there is a conſiderable fall in this land, from eaſt to weſt, I thought it expedient to put two drains into it; and this appears to me to have been neceſſary, from a conſideration that both theſe drains continue to run in the ſame proportions as when firſt opened. The manner in which theſe drains were executed, was, by digging through the different upper ſtrata, and as deep into the clay as the main open drain would admit; then digging or boring through the remaining part of that clay into the quick ſand, at the diſtance of about ſix yards, in a progreſſive manner.

The water riſing rapidly, through theſe holes, into the cloſe drains, has effected a compleat cure of this land, every part of which will now bear a horſe to gallop upon it. Theſe drains diſcharge three thouſand ſix hundred and ſixty gallons an hour, which is much leſs than they did at firſt, as muſt be the caſe in all bogs. This land will be worth twenty ſhillings per acre. The draining coſt twenty-five pounds: and the length of the under-ground drains is eight hundred and fourteen yards.

I have juſt now finiſhed draining another piece of land, about forty-three acres; and as this was intended to anſwer two purpoſes, one to drain the land, and the other to give an additional ſupply of water to a mill-pool; and, as a circumſtance aroſe in the execution of this work, which frequently happens in draining land, namely, a ſudden alteration in the poſition of the under ſtrata, a deſcription thereof will not, I hope, be thought tedious. This draining was begun at the level of a mill-pool, and continued without any great difficulty to the diſtance of about thirtv-two chains, in the manner before deſcribed as a cure for the ſecond claſs of boggy land: but, at or near that place, the under ſtrata altered their poſition; the quick ſand which conveyed the water, now became of twice its former thickneſs; and the clay which had hitherto been above that quick ſand for ſome diſtance, diſappeared. From the quick ſand thus becoming ſo much deeper, we could not, with the level of the mill-pool, cut through it; nor, indeed, from the wetneſs of the ſeaſon (November 1791), would ſuch an operation have been proper. I therefore continued a ſhallow drain to ſome diſtance making ſide holes into the quick ſand, which ran freely; but as this could not cure the whole of the bog below, we branched out another drain, which was made by the method deſcribed for curing the ſecond claſs of wet or boggy land, by ſinking a cloſe drain, through the upper ſtrata, into the upper clay, and then, at a ſmall diſtance, on one ſide of this cloſe drain, boring a hole, with an auger, through the remaining part of that clay into the quick ſand, and, at every eight yards, as this cloſe drain advanced, ſtill boring other holes, in the ſame manner as before deſcribed: through many of theſe holes, the water ruſhed with great rapidity.

The water diſcharged by theſe drains into the mill-pool, is one hundred and ſixty-eight gallons per minute, or three thouſand ſeven hundred and eighty hogſheads in a day, which is after the rate of one million three hundred and ſeventy-nine thouſand ſeven hundred hogſheads in a year.

About ſix acres of this land were always ſound; about twelve acres on the north ſide were an abſolute pulp, and the remaining twenty-ſix acres very unſound.— The whole is now ſound, and will, when cultivated, be worth ſixteen ſhillings per acre. This land would have been drained at a much leſs expence, into the main open drain; but then the water, which was much wanted for the mill, would have been loſt. Theſe cloſe drains are in length one thouſand four hundred and fifty-two yards, and coſt one hundred pounds, of which about thirty pounds ought to be charged to the mill.

If any part of the foregoing account ſhould want further explanation, it will be gladly given by,

SIR,

Your very humble ſervant,

JOHN WEDGE.

Bickenhill, near Coventry,
January 28, 1792.

Mr. MORE.

WE do hereby certify, That the facts ſtated in the foregoing Paper are true, with this reſervation on the part of Mr. Jaques; that he was not preſent when the quantity of water was meaſured: but, as Mr. Jones was preſent, and he (Mr. Jaques) alſo knowing that great ſtreams of water are diſcharged by the different drains, has not the leaſt doubt of the fact.

JOHN JAQUES,
Rector of Packington,
JOHN JONES.

Packington, Warwickſhire,
January 30, 1792.

The